Modernizing Airpower Projection Capabilities
Future Needs and Options

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In light of our resounding victory in the Persian Gulf War and the strong pressures to reduce DoD spending, many observers are questioning the need to modernize U.S. airpower assets, at least in the near term. Even if modernization is desirable, these critics argue that the nation cannot afford it.

This paper challenges that view. We argue that certain airpower systems must be modernized if the United States is to preserve the military capabilities demonstrated in the Gulf War. Just as the Gulf War successes arose from airpower developments in the 1960s and 1970s, aircraft and weapon developments of today will provide the force structure of the year 2010 and beyond.

The focus of this paper is the military rationale for both substance and timing of specific airpower modernization options. Although budgetary constraints will clearly be important to modernization decisions, and we discuss some cost-related issues here, these issues are largely left to a subsequent paper.

WHY MODERNIZE?

Arguably, airpower dominated the war in Operation Desert Storm and even dictated its outcome. Through the combined actions of all four services and their coalition partners, airpower paved the way for the rapid and overwhelming ground victory, a victory achieved with remarkably few casualties and minimal collateral damage. This outcome was obtained through:

- **Rapid control of the air.** Allied air forces flew unopposed over Iraq for much of the war, and U.S. ground forces were never threatened with attack from Iraqi aircraft.
- **Effective interdiction.** Moving ground forces were under omnipresent threat of attack, pinning forward-deployed forces in their defensive locations. Meanwhile, attacks on lines of supply and communication largely halted supplies to troops in the front lines, diminishing their combat effectiveness.
- **Denial of effective enemy command, control, communications and intelligence.** Iraqi “information collapse” permitted allied air and ground deployments and employments to go largely undetected, leaving the Iraqis unable to respond to the information that was available.

Few expected this dominance at the start of the war, but its achievement has set a new norm for how the United States judges its force capabilities for the future.
Nonetheless, the lesson from the Persian Gulf War is not that the United States has enough airpower for its future needs, but rather that the airpower capabilities exhibited in the Gulf War are a national asset that the United States should strive to preserve and extend. Airpower alone cannot win wars, but it can be a critical factor in deterring or defeating large-scale aggression of the most worrisome kind.

Our future opponents will study and learn from Desert Storm. In future major contingencies, the United States will likely be faced with the challenge of deploying forces over long distances, into hostile environments, against enemy forces that initially outnumber U.S. and allied forces, where ports and bases are threatened by attack, even by weapons of mass destruction, and where rapidity of force projection will be critical to prevent early enemy victory. Should such a conflict begin before U.S. deployments are established, airpower, delivered by the Air Force and the Navy, will be the primary (perhaps only) U.S. option for halting the invasion and stabilizing the situation.

We assert (without detailed proof in this paper) that existing technology offers the prospect of retaining desirable airpower capabilities under conditions far less favorable than Desert Storm, perhaps the most important reason for pursuing airpower modernization. In addition, there are at least four other reasons to pursue airpower modernization, some or all of which apply to different portions of our forces. First, many of our first-line aircraft are aging and must be replaced within the next 10–20 years. Second, new threat technologies will almost certainly emerge to challenge existing U.S. airpower assets; a technological competition still exists, one which the United States cannot afford to ignore. Third, the full potential of airpower cannot be attained without selected modernization. Fourth, the smaller size of the U.S. future force posture will place a higher premium on the quality of individual systems.

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1There were also shortcomings to our airpower capabilities in the Gulf War. The attempts to locate and kill Iraqi SCUD missiles, while politically effective, were a failure by any other standard. In addition, some especially favorable conditions of Desert Storm may not exist in the future, notably generally excellent weather (after the first few days), open terrain, and heavy enemy reliance on tanks which, under the favorable observation condition, were excellent targets for airpower assets.

2This point is contentious. Some airpower enthusiasts believe that the proper application of airpower against a country’s centers of gravity will produce victory without the need for a ground war. Perhaps, but to date history is on the side of those who doubt it.


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SOME UNDERLYING ASSUMPTIONS

This paper operates under the following assertions and assumptions. First, although airpower assets can play an important military role in almost all conflicts, they will make their greatest contribution in major conflicts in regions of the world far from the United States. Much of the modernization suggested in this paper deals with providing capabilities to deter and, if necessary, defeat hostile aggression in major regional conflicts with minimal casualties.

Second, the U.S. force postures will shrink well below current levels. Our aircraft modernization options should be viewed in terms of an Air Force force posture of roughly 20 fighter wings (made up roughly of 4 wings of air superiority fighters, 11 wings of multirole fighters, and 5 wings of other, e.g., recce or SEAD, aircraft) and 10–12 Navy aircraft carriers with a roughly equal number of carrier fighter wings (whose composition remains to be determined).

Third, although airpower assets consist of many systems (e.g., aircraft, weapons, C3I systems, etc.), this paper focuses on aircraft because aircraft constitute the most costly portion of the modernization effort. In the following pages, we assess modernization alternatives and suggest desired approaches for both air superiority and air-to-ground power projection assets.

MODERNIZING AIR SUPERIORITY FIGHTER FORCES

The cornerstone of U.S. airpower strategies is the capability to gain and maintain control of the skies rapidly and with high confidence. The key asset that allows military services to accomplish this objective is the air superiority fighter. Although Navy and Air Force air superiority fighter aircraft have performed well against opponents, both services are actively pursuing options for modernizing their respective aircraft.

The F-14, the Navy’s air superiority fighter, was mainly acquired in the 1970s and, with life extension programs, will reach its structural lifetime limits around 2010. Unfortunately, the Navy’s F-18C multirole aircraft will begin to age out even earlier. For this reason, the Navy’s decision on a replacement for the F-14 is highly constrained by budget realities. At present, the multirole F/A-18EF is the planned replacement for both the F-18C and the F-14. Multirole force issues are discussed below, but given the constraints on Navy

4We do not discuss the various specialized assets and capabilities possessed by the United States, such as defense suppression aircraft, jammer platforms, and information-gathering platforms. These assets provide capabilities unmatched anywhere in the world, are a relatively small portion of our force in terms of numbers and cost, and are obvious and necessary candidates for continued modernization.
decisions, we will focus here on the Air Force's air superiority modernization decision.

Although, with life extension programs, the current Air Force air superiority fighter, the F-15C, will not reach its structural lifetime limits until 2010 or later, the Air Force plans to begin replacing these aircraft in the late 1990s with the F-22. To maintain reasonable force capabilities (even at reduced force levels), avoid unmanageable budget spikes, stay within general budget ceilings, and provide some industrial stability, the United States must phase its tactical aircraft modernization programs over time. For these reasons, and to assure unchallenged air supremacy, the F-22 is being developed first; the replacement for the F-16 will follow.

Why Not Buy More F-15Cs?

Before we can begin to argue the benefits and costs of the F-22 and other alternatives, we need to answer a more basic question: Why can't the United States buy more F-15C aircraft? The recent overwhelming success of the F-15C in Operation Desert Storm reinforces this question. Why modernize a force that so totally dominated recent opponents?

The answers to these questions lie not in the past but in the present and future. Present U.S. dominance of the skies rests on three key factors: the capabilities of U.S. aircraft platforms, the capability of U.S. air-to-air weapons and avionics, and the level of training and skill of U.S. pilots. When we examine the potential capabilities of future adversaries, we see the reasonable possibility of substantial threats to this dominance emerging over the next 10–20 years.

It is undoubtedly the pace of foreign tactical aircraft modernization has been slowed by the collapse of the U.S.-Soviet competition. Nevertheless, U.S. intelligence agencies continue to estimate upgrades to foreign fighters, including new AI radars, air-to-air missiles, and reduced observables. Figure 1 indicates the extent to which likely threat upgrades can erode current U.S. advantages. U.S. strategy for major wars calls for rapid victory with minimal casualties. Parity or near parity with an opponent is simply unacceptable; it leads to extended air battles with heavy losses to both sides.

The erosion of U.S. technical advantage evident here is largely driven by the combination of missile

\[5\]The results shown are from computer modeling of 4 vs. 4 aircraft engagements assuming equal pilot ability. "Exchange ratio" refers to the ratio of expected losses of aircraft in these engagements. The "Mirage 2000 + Semi-Active Missile" threat represents assets that U.S. pilots would face today. The "Flanker + Active Missile" threat represents assets that Russia is currently marketing. The "Future Threat + AIM-120 Missile" consists of straightforward RCS reduction techniques, a better radar, and an AMRAAM-like missile.

\[6\]The limited RCS reduction assumed in the future threat will almost certainly appear on future foreign aircraft. However, we do not expect to see current advanced U.S. stealth capabilities matched by foreign aircraft designers during this time frame.

Figure 1—F-15C with AIM-120 vs. Future Threats

Two current U.S. advantages are not incorporated in the technical analysis shown above: pilot training and numbers. The United States has consistently invested in well-trained pilots. Others, especially Third World countries, have so far lacked the ability to pursue realistic operational training. Perhaps this trend will continue in the future, virtually guaranteeing U.S. superiority in the air. Nevertheless, it is a mistake to assume that the task is insuperable. For instance, the Israeli Air Force maintains a highly skilled pilot force with an economy a small fraction of the size of that in the United States. More than money, training a pilot force requires consistent and purposeful action over time. The United States cannot afford to assume that all
potential opponents will lack long-term competence and direction.\(^7\)

In the same vein, advanced U.S. air forces vastly outnumber all others (China and Russia excepted); perhaps overwhelming numbers of F-15Cs will solve the problems noted above. This notion, although appealing, considers neither our shrinking force structure nor U.S. deployment constraints, which will limit the early numbers of U.S. aircraft available to fight in any given theater. U.S. opponents will continue to enjoy a home field advantage, at least at the start of campaigns. During this phase, a few squadrons of quality aircraft could seriously contest U.S. air superiority.

In addition, likely opponents may find surface-to-air defenses more affordable than fighter forces as a means to challenge U.S. air superiority over their territory. The stealth characteristics of the F-22 should provide it significant advantages over the F-15 in gaining total control of the skies.

Given the critical importance that our current and future strategies place on theater-wide air superiority, the clear and reasonable path of threat evolution, and the uncertainties surrounding the relative quality and quantity of future opposition, it becomes clear that the United States, as it replaces aging aircraft, should move beyond the capabilities of the F-15C.

**Air Superiority Modernization Options**

Modernization can take the form of a new aircraft design, the F-22, or modification and upgrade of an existing design, an option we term the “F-15I.”

The F-22 is currently in the engineering and manufacturing phase of development. It is an all-aspect, stealthy fighter, outfitted with advanced avionics, including an electronically steerable array (ESA) radar and advanced countermeasures. Although designed primarily as an air-to-air fighter, with minimal modification the F-22 can carry two 1000-lb class JDAM I air-to-ground weapons. Our analysis indicates that the F-22 will maintain extremely high capability (exchange ratios of 20–30:1) against all conceivable threats, through a combination of stealth, avionics, and weaponry.

Alternatives to the F-22 do exist, however. The most reasonable of these would take advantage of the fact that as a result of Saudi F-15E production, the F-15 production line remains available, allowing an upgraded variant, the F-15I, to be developed and procured on roughly the same schedule as the F-22. ESA radar technology must be used to enhance radar capability as well as allow some RCS reduction, and avionics and countermeasure devices need to be added to further enhance survivability. Current missile capabilities could also be enhanced with addition of a longer-range variant of the AIM-120 missile.\(^8\)

The major reason the United States might wish to pursue such an alternative is, quite simply, lower cost. An F-15I should cost less to develop and procure than the F-22—perhaps as much as 20 percent less. But lacking firm data, this is speculative.

What the United States would purchase at this lower price would be a capable air superiority weapon system, albeit lacking both the F-22’s level of effectiveness and its robustness to threat evolution. Our analysis indicates that the F-15I with an AIM-120C would maintain its effectiveness against the future threats examined above, at least until the opponent deploys long-range missiles.\(^9\) Unfortunately, the appearance of such missiles could easily predate the IOC of the F-15I.

Given a choice between these two approaches, we believe that the F-22 is the clearly preferred air superiority modernization option for a number of reasons:

- The F-22 will maintain a dominant, enduring air-to-air capability against all threats over the next 20 to 30 years.
- All-aspect signature reduction on the F-22 will allow it to deal effectively with surface-to-air defenses, a critical factor in assuring air superiority over enemy territory if our opponents pursue heavy surface-based defenses.
- Emphasis in the F-22 design on reliability, maintainability, and deployability should provide significant operational and support advantages.
- The F-22 builds on and augments our investment and current advantage in stealth technologies—an ongoing area of military technological competition.
- Design and procurement of a new aircraft such as the F-22 would help maintain our shrinking defense aerospace industrial base.
- A new design will provide flexibility in the far future. Since the United States rarely uses its aircraft solely for the original design purpose (witness the F-15), this flexibility could be a critical factor.

We have reached our conclusion on the F-22 through both analysis and subjective balancing of benefits and costs; these conclusions might change if F-22 costs

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\(^7\) In addition, longer-range active missile and enabling avionics technology may simplify the task of pilot training by lowering the relative importance of close-in, high-g dogfighting.

\(^8\) Improved kinematic performance is a preplanned product improvement program for the AMRAAM (AIM-120C).

\(^9\) The technologies that enable longer-range, active missiles are being actively pursued in several nations. France, for example, is currently pursuing ducted rocket technology development.
increase significantly. Cost should remain a key item of scrutiny for the F-22 program.

MODERNIZING AIR-TO-GROUND ASSETS

Freedom of the skies during Desert Storm allowed the United States and its allies to bring to bear a staggering array of air-to-ground capabilities, from precision strikes against bunkers, aircraft shelters, and individual tanks to wide-area attacks against troops and supply areas. Many platforms were used with a wide variety of weapons.

Despite the impressive performance in Desert Storm, the United States faces a range of modernization issues with respect to its air-to-ground forces. We discuss three especially critical areas here: (1) air-to-ground weapons and sensors, (2) deep attack and interdiction forces, and (3) multirole fighter forces.

Advanced Weapons for Bombers and Fighters

Weapon procurements are a very small portion of service budgets. Thus, it is remarkable that our current ground target attack capabilities can be improved by almost an order of magnitude through improved weapon lethality with a very modest investment. This advance, when coupled with the scale of projected threats, brings within reach the ability to destroy most fixed targets and many mobile targets early in a conflict. With technologies under development today, weapon effectiveness should be limited more by near-real-time target location and identification problems than by weapon (or munition) lethality considerations.

But the United States must buy the weapons and integrate them into its weapon systems, and weapons have historically been given short shrift when budgets tighten. The classes of weapons now in development could provide a quantum leap in U.S. capabilities to accomplish rapidly most conceivable targeting objectives with minimal collateral damage, regardless of time of day or weather. Aside from defeat in the budget wars, the greatest risk is the urge to add “nice-to-have” attributes to those required. Remarkable performance is available, but each increment of added performance also adds cost and risk, delaying the realization of needed capabilities.

A number of weapon and munition initiatives, most of which should be vigorously pursued, are now in various stages of procurement or development. Among the most important are the JDAM family of weapons, which will provide fighters and bombers with all-weather, day or night, precision-strike capability at relatively modest cost; the family of sensor-fused antiarmor submunitions, including SKEET and BAT, which provide a multiple-armor-kills-per-sortie capability to fighters and bombers; and suitable standoff weapons, including JSOW (short-range), TSSAM (medium-range), and TLAM (long-range), each of which provides high-confidence kill capabilities against heavily defended targets. Figure 2 shows key capability improvements possible with some of these weapons. Plotted is the fraction of the Desert Storm Master Target List that could be attacked with greater than 80 percent chance of hitting the target (single-shot probability of hit, or SSPH, greater than 0.8) versus the accuracy of the attacking weapon. The most accurate weapons are generally those with terminal seekers. JDAM-1 weapons, with GPS-aided inertial guidance, vary in accuracy depending on weapon/aircraft integration and targeting methods.

![Figure 2—Target Coverage vs. Weapon Accuracy](image)

Procurement and integration of these modern weapons continue to represent the single most cost-effective step that could be taken to improve our air-to-ground capability. A conservative estimate of the costs for all of these programs is $15 billion to $20 billion of RDT&E and procurement, spread over 15 to 20 years, with no significant rise in manpower requirements. Moreover, as discussed below, successful development of these weapons and integration with fighter and bomber forces

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10An inertially aided tactical munitions dispenser, currently planned, should enable effective employment of sensor-fused weapons from medium to high altitude in the near term.

11An increased-range air-launched cruise missile (roughly 400 miles versus TSSAM's 150 miles) should be added if the United States wishes to employ B-52G bombers effectively before full establishment of air superiority. Additional conversion of ALCM missiles to ALCM-C variants could serve this purpose at very low cost.

The ability to hit the target (as plotted) is only one component of lethality. Some targets (a small fraction) will require explosive charges larger than planned for JDAM, TSSAM, JSOW, and TLAM.
may enable the United States to avoid replacement costs for interdiction fighters.

**Deep-Attack Forces**

U.S. planners face important decisions about deep-attack aircraft. In the near term, several steps are necessary if the United States is to reorient its bomber force toward conventional warfighting. In the farther term, the United States faces the need to replace the aging elements of the interdiction fighter force.

**Near-Term: The Bomber Force.** Recent RAND analysis has shown that bomber forces equipped with modernized weapons (i.e., those discussed above) can have a dramatic effect on the outcome of large regional conflicts. The bomber's inherent range-payload attributes provide the potential, through their ability to initiate near-immediate operations from CONUS and non-theater overseas bases, to deny an enemy quick victory. As fighter forces arrive, the bomber forces can add to the weight of the attack against virtually all enemy target types, hastening the pace of victory. Given its stealth characteristics, the B-2 is particularly attractive for employment against enemy targets before establishment of air superiority. Figure 3 illustrates some of the weight that bombers can provide early, to far-flung theaters.\(^\text{13}\)

Some bomber force modernization measures, such as survivability improvements to the bombers and integration of the modernized weapons addressed earlier, have been spelled out in the Air Force’s bomber roadmap. Although the roadmap will result in a more effective conventional bomber force, additional actions are needed to reach the full potential of these bomber/weapon systems. The focus of additional efforts should be on creating a more flexible bomber force, with rapid access to targeting and threat information, the ability to respond more swiftly to changing conditions, and the flexibility to employ a variety of munitions through weapons carriage modifications.

Current bomber roadmap costs are $3 billion to $4 billion over several years; this modernization would be cost-effective at twice the price.

**Far-Term: The Interdiction Fighter Force.** Two of the Air Force’s interdiction fighters, the F-111 and F-117, are aging and may have to be retired early in the next century. Navy A-6 aircraft will likely be retired by the end of this decade. There are two realistic options for addressing this issue:

1. Do not replace these aircraft. Place the responsibility for deep attack on a combination of the F-15E force, modified F-14 aircraft,\(^\text{14}\) the bomber force, long-range cruise missiles, and the F-22 modified to carry JDAM internally.\(^\text{15}\)

2. Replace all current deep-attack aircraft with a high-end, joint aircraft specifically designed as a deep, stealthy, precision-attack aircraft capable of carrier and land employment.

It is in the area of interdiction fighter forces that the United States can reap the benefits of the modernization measures we have proposed earlier. At this time, we believe that Option 1 is preferred and, specifically, that the modernization measures discussed previously eliminate the near-term need to develop the A/F-X. This approach assumes that the Navy will not replace its deep-attack aircraft with a new aircraft and will focus on cruise missiles as the sole, future naval deep-strike option, a direction that appears consistent with the Navy’s recently adopted Littoral Strategy.

We base our argument on three fundamental assumptions: (1) new and more effective weapons will be successfully developed, (2) bombers will be successfully “conventionalized,” and (3) the F-22 will be procured and ground-attack variants will evolve as did the F-15.

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\(^\text{13}\)For a complete set of assumptions on sortie rates and weapon loadouts, see David Ochmanek and John Bordeaux, “The Lion’s Share of Power Projection,” Air Force Magazine, June 1993. Bombers are assumed to fly from Guam, Diego Garcia, and Fairford. Sortie rates for bombers therefore range from 0.5 to 0.25.

\(^\text{14}\)Initial plans call for adding an LGB delivery capability to the F-14 as well as compatible bomb racks. Additional modifications to enable JDAM, TSSAM, and JSOW would be required.

\(^\text{15}\)The F-22 can carry two 1000-lb class JDAM I weapons with minimal modification.
The weapons discussed above would allow a wide range of aircraft, both bombers and fighters, to conduct accurate attacks under nearly all weather conditions without the need to carry and integrate laser designator equipment. With standoff, such attacks could be carried out at ranges sufficient to ensure the survivability of delivery aircraft and naval forces.

The bomber force, with suitable modification and weapons, greatly expands our deep-attack capability. B-52 aircraft served as area-attack systems and cruise missile carriers in Desert Storm and could continue this role in the future. In addition, the B-2 bomber has the potential to add unique capabilities, namely, rapid, long-range, high-payload, accurate, stealth-attack capabilities. Finally, and in spite of the many problems associated with the B-1B,\textsuperscript{16} we believe that a combination of the standoff capabilities of weapons such as JSOW and TSSAM and an emphasis on integrated conventional operations with tactical aircraft will result in effective B-1B conventional employment, filling the F-111 strike role.

Finally, if procured, a modestly modified F-22 force (capable of delivering two JDAM-1 weapons as discussed above) could be turned to several uses after air superiority is achieved, including ground attack and SEAD operations. Our analysis indicates that, in the ground-attack role, the amount of accurate ordnance delivered by the F-22 force could in fact be substantially higher than that of the current F-117 force. The F-15E and F-14 supplement the capabilities above and maintain the capability to employ laser-guided bombs where appropriate.\textsuperscript{17}

Option 1 is consistent with our previous modernization arguments: It builds upon investments in bomber and weapon modernization and capitalizes on the stealth capabilities of the F-22. It is also in line with fiscal reality, a reality made harsher by the relatively near-term need to address the multirole fighter force.

The Multirole Fighter Force

The relatively inexpensive and numerous F-16 is currently the Air Force's multirole fighter (MRF) and constitutes the bulk of its force structure. Given current uncertainties about the service life of the various F-16 variant airframes and the ultimate number of land-based multirole wings in our future forces, the procurement start for F-16 replacement probably begins after the year 2005 and possibly later. This was, in fact, the timeline for Air Force MRF procurement until very recently.

As noted previously, the Navy faces a much nearer-term fighter modernization problem than the Air Force. Current plans call for the Navy to replace its F-18C force with F/A-18EF aircraft. The Navy has argued that the F/A-18EF is a straightforward upgrade to previous F-18 variants. In essence, this means that the F/A-18EF can be procured in the relatively near term, as early as 1999.\textsuperscript{18}

Figure 4 paints a stark picture of the expected lifetime of the Navy and the Air Force multirole force structure over time.\textsuperscript{19} Many potential solutions to this dilemma have been floated, and many new aircraft combinations have been discussed, including new concepts such as the Joint Attack Fighter (JAF).

In this debate, three options have received considerable scrutiny:

1. The Navy replaces its entire force with F/A-18EF aircraft in the near term. The Air Force delays procurement of a nonjoint MRF until roughly 2010 by a combination of near-term procurements, F-16 SLEP efforts, and force reductions. This approach is similar to current plans.

2. The Navy and Force both procure the F/A-18EF as their (now joint) multirole aircraft. This option requires that only one multirole aircraft be procured and, because of shared costs, could mean a larger Air Force multirole force than could be expected if the Air Force pursued multirole development on its own, depending on the unit cost of the respective aircraft.

3. The United States delays the onset of both Navy and Air Force retirements and develops a new, joint multirole aircraft, the JAF. Options to delay the onset of force retirements would include life extension programs for current assets and some new, near-term procurement. Naval near-term procurement could include the F-18C. Air Force near-term procurement could include F-16 or F-15E aircraft.

\textsuperscript{16}Numerous observers have noted that the F/A-18EF differs significantly from previous F-18 variants. It is possible that F/A-18EF development may slow if concerns over technical risk are valid. See Charles Spinney, "Fly Off F/A-18E vs. 18C," Proceedings of the Naval Institute, September 1992.

\textsuperscript{17}The F-16 estimates are based on an 4000-hour lifetime for F-16 blocks 10-30 and 8000 hours for later blocks and include the latest decision to procure the aircraft in 1993. F/A-18EF lifetimes assume a 3500-hour life for the F/A-18AB variants.
Figure 4—Relative Multirole Forces Over Time

Option 1 addresses the split between the Air Force and the Navy in terms of the timing and relative cost of their multirole fighters. It satisfies the Navy’s near-term need while deferring the Air Force’s decision until MRF development can be afforded. However, given the similarity in the Air Force and Navy multirole mission, Option 1 seems unsatisfying. The F/A-18EF is only a modest improvement over the F-18C, and future budget constraints may force the Air Force to acquire either of the low-cost MRF or fewer aircraft. The combination of two aircraft development programs and smaller aircraft buys for each would seem to create unnecessary costs for the nation.

Option 2 better addresses this cost concern. Given R&D savings, the larger buys associated with a joint program, and reasonable programmatic timing, Option 2 may be more affordable to both services, costing less overall than separate programs.20 Although the F/A-18EF will cost more per unit than either the F-18C or the F-16, it is also somewhat more capable than either aircraft. But Option 2 results in a multirole force (the bulk of our fighter forces) that consists largely of 1970s technology for the next 30+ years. This prospect should be disturbing, especially when we contemplate the potential for radical change that the world has so recently demonstrated. At the very least, this decision would place a very high premium on the air superiority and ground defense suppression elements of our force, perhaps leading to other, indirect costs.

Option 3 addresses the weaknesses of Options 1 and 2. It has the cost benefits associated with a single, jointly purchased aircraft and could avoid potential technical obsolescence. However, Option 3 has its own set of difficulties. The poor record of past Navy/Air Force joint aircraft developments is testimony to the problems of the joint approach—there are many difficult technical tradeoffs involved in creating aircraft that meet both services’ needs. Moreover, the disparity between the Navy and Air Force cost and schedule requirements may be too great to bridge with a single, new, joint program.

So, we appear to be back where we started. The arguments have come full circle. Although the budgetary and timing requirements of the multirole fighter debate are well understood (and more flexible than many would imply), we believe that the desired characteristics of a future multirole fighter are not at all clear. For instance, in the context of our total force structure, should the future multirole aircraft be more heavily weighted toward ground attack than current aircraft? Should they be equipped for defense suppression? How do new weapons (air-to-air and air-to-ground) affect the avionics needed on the aircraft? How stealthy should future multirole aircraft be? No persuasive answers to such questions currently exist.

Therefore, we propose a fourth course—delay and decide—which is in many respects a hybrid of all three above. Moderate near-term procurement and life extension efforts can gain the United States both time and budget leeway—two years is easily feasible. The time gained should be used to conduct a thorough analysis of the above three options in terms of their likely budgetary effect and the adequacy of capability they would provide the nation over time. Building on this base of knowledge, the budget leeway gained should enable the United States to more effectively pursue a more considered multirole force modernization strategy. Our haste in dealing with present budget extremities should not risk the future effectiveness of the bulk of our air forces.

CONCLUDING REMARKS

We have suggested an approach toward airpower modernization, with an emphasis on preserving the fundamental capabilities that served this nation well in the Gulf War and augmenting those capabilities in anticipation of new threats and new opportunities. Figure 5 summarizes our conclusions. We make several specific recommendations: (1) procure the F-22, (2) fully fund and integrate an array of air-to-ground weapons, (3) fully fund the bomber roadmap and consider additional measures to improve conventional bomber capabilities, (4) cancel the A/F-X interdiction fighter program, and (5) delay a near-term multirole fighter

20Recent cost estimates for the F/A-18EF raise questions about affordability. The Navy is estimating the average unit cost at $60M; others place it even higher.
through a combination of reduced force levels, suitable acquisition phasing, and reduction of cross-service duplication of effort where reasonable. Affordable airpower acquisition strategies are outlined in a forthcoming companion Issue Paper.

Affordable, modernized airpower forces should form a key element of future DoD force posture. Such forces promise vital, potentially war-winning capabilities across a spectrum of potential conflicts. The United States faces a series of difficult choices as it strives to strike a critical balance between budget demands and a continued unrivaled military capability for the nation. We believe that the approach outlined here strikes that balance both for now and, more important, for the future.

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