



Pacific Pivot

**Implications
for U.S.
Fighter
Aircraft**

**The Pacific Pivot:
Implications for U.S. Fighter Aircraft**

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Executive Summary

In January 2012, the Obama administration announced that American defense strategy would “of necessity rebalance toward the Asia-Pacific region.” This was the biggest shift in defense strategy since the post-9/11 period, and it has the potential to impact forces and programs for many years.

Fighter aircraft modernization is a critical component of the rebalance to the Pacific. Control of the air is the essential basis for joint operations, partnership, crisis response and deterrence. It may come as a shock then, that the US has serious challenges and choices ahead to maintain air dominance.

China’s growing military challenge has been some time in the making. With a revamped fighter force, two new stealth fighters in development and an aircraft carrier, China could by 2020 be in position to disrupt air operations and vie for control of the air in the Pacific. The strategic challenge of China is coming at a time when the US is lagging in fighter force structure replacements for the Air Force, Navy and Marine Corps.

Had all gone according to plan, the U.S. would have already replaced most of its 1970s-design fighters with a joint force centered on the F-35 and with special roles for the Air Force F-22 and Navy F/A-18EF. Instead, a combination of urgent wartime needs, program cuts, delays in the F-35 program and slow retirements of old aircraft have left a complicated situation.

The timing could hardly be worse. Anti-access and area denial threats are now present in the form of sophisticated surface-to-air missiles which U.S. forces have never faced in combat. Added to this is the development of advanced adversary fighters. Re-calculation of fighter requirements in the Pacific has become essential. Several scenarios are likely to drive the fighter requirement over the next decade. They are:

- **Countering North Korean Aggression.** If North Korea invades, U.S. fighters must be in place to attack the opposing force, provide close air support and interdiction as well as fly offensive counter air missions to crush air defenses. Analysis indicates this canonical scenario could consume 900 or more fighters all by itself.
- **Access in the South China Sea.** A brewing confrontation over disputed islands might require a show of force, internationally-mandated no-fly zones, persistent ISR, open ocean surveillance, and securing the commons. U.S. fighters might take the lead in ongoing combat air patrols to fend off enemy air intercept and contribute to other surveillance and security missions.
- **Air Battle over Taiwan in 2020.** A Taiwan straits crisis might develop not as an airborne assault, but as a contained, intensive battle for control of the air with each side firing shots and taking losses. Dominant air would determine which side had the upper hand and how successful the U.S. and allies might be in controlling escalation.

- **Extending Ground Attack.** Another version of the Taiwan scenario might extend to limited strikes on the mainland to deny use of airfields, missile launch sites or other offensive capabilities. Keeping this option open would require a fighter force to ensure strike missions could be carried out in heavily defended airspace.
- **Challenges in the Second Island Chain and Beyond.** After 2020, China's forces are on track to be capable of power projection operations to support policy objectives should they so choose. In a potential air confrontation over the Pacific Ocean, U.S. forces and allies may be defending their bases and fleets at multiple locations. Coping with an anti-access environment generated by surface-to-air missiles and by growing numbers of "red" adversary fighters places high demands on the U.S. fighter force in these scenarios. In peer conflict, the U.S. fighter mix benefits from adding stealth F-35s to maintain superiority in ongoing battles for air control at multiple locations.

Taken together, these scenarios show a high potential demand for fighters. Legacy fighters have been cut in numbers; they are also known to be less capable against anti-access and area denial threats. The Pacific pivot depends on continued modernization with new aircraft to maintain force levels and keep the edge. The scenarios beyond 2020 require the package of stealth, ECM and other sensors combined in the F-35 fleets to ensure the U.S. keeps the upper hand in deterrence or crisis response.

Recent studies have suggested that an adversary's opening tactic may be to launch hundreds of short-range ballistic missiles against airfields in an attempt to cut runways and destroy aircraft on the ground. While that's possible, the U.S. and allies in fact have many options for "fighting through" attacks on bases. Base vulnerability is an important consideration – at land and at sea – but not necessarily a game-changer because it can be mitigated by tactics such as launch-on-warning and aircraft dispersal. Maintaining air dominance is one of the most essential force modernization tasks to flow from the Pacific strategy. The top priority is to assure that the fighter force has both the advanced capability and the numbers to do its part in providing crisis response options and ensuring deterrence.

The way ahead is to efficiently buy out the F-35 so that the USAF, USN and USMC all have a highly capable, interoperable platform. For the F-35, the best course is to accelerate to efficient production rates that bring 1,000 F-35s into the tri-service inventory by 2020. The next step is to invest in development of several next-generation technologies and give them time to mature. The fighter of the future deserves new, fuel-efficient engines with supersonic performance and enough power for new sensors and directed energy weapons. That leaves the F-35 as the core capability to meet current needs, bridge the period of future technology development, and get the Pacific pivot on track.

Introduction

The Pacific pivot is one of the most exciting and significant shifts in American military strategy in decades. The Obama administration announced in January 2012 that “while the U.S. military will continue to contribute to security globally, *we will of necessity rebalance toward the Asia-Pacific region.*”¹

American defense planners are just beginning to think about how to shape forces for the Pacific pivot. To date, discussions of the Pacific pivot have centered on ballistic missiles, submarines, naval ships and space and cyber warfare. Yet nothing is more crucial for the Pacific than control of the air. To a great extent, control of the air and maneuver at sea define great power status in the Pacific theater. Assured air control is a prerequisite for everything from freedom of maneuver and crisis response to full-scale conventional deterrence and strike options. U.S. military and diplomatic options will depend on whether the U.S. can maintain air dominance.

It may come as a shock, then, to learn that the US is facing serious challenges to air dominance in the Pacific in the years ahead. The main reason is the strategic challenge of China. “Let’s just put aside all the moral, humanitarian, do-good side of what we believe in, and let’s just talk, you know, realpolitik,” Secretary of State Hillary Clinton said during Senate testimony. “We are in a competition with China.”

The growing military challenge has been some time in the making. China’s military modernization began in earnest in the late 1990s. A decade and a half of focused effort has put China in a stronger position than ever before. Count the recent developments: the aircraft carrier *Liaoning* on sea trials, two stealth aircraft in development, the wholesale revamping of China’s military doctrine and its air forces. At this rate, China could by 2020 be in position to disrupt air operations and vie for regional control of the air.

All this “could be a problem if Obama’s pivot ever has to go from push to shove,” wrote one commentator.²

Deterrence with conventional forces is integral to the defense strategy pivot. So are U.S. ties with partners and allies in the region.

¹ The White House, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, p. 2.

² Eric Talmadge, “How Asia Sees Obama’s Pivot to the Pacific,” AP and Huffington Post, November 20, 2012.

³ The White House, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, p. 2.

“Our relationships with Asian allies and key partners are critical to the future stability and growth of the region,” the strategy stated.³ Air capabilities feature prominently in regional partnerships. The Asia-Pacific region is home to some of the world’s most sophisticated and active air forces. Airpower will play a large role in defining the balance of power and in knitting together the abilities of allies in the region.

Partnerships and military options alike therefore depend on the wide-ranging capabilities of the U.S. fighter force: defined here as the land and sea-based fighter and strike aircraft of the Air Force, Navy and Marine Corps. During the past decade of counterinsurgency warfare, the fighter force was able to take on unexpected missions even as it aged. Aircrews carried out the tasks of strike, close air support, armed overwatch and non-traditional intelligence surveillance and reconnaissance (NTISR) in the relatively benign airspace of Iraq and Afghanistan.

Now, with the Pacific pivot, wargame scenarios from presence operations to full-scale deterrence demand more attention. For example, commitments to Korea count on immediate and heavy employment of fighters. The possible competition with China opens up more demands. A recent RAND analysis placed China’s People’s Liberation Army Air Force or PLAAF at “major-power standards in terms of the hardware it can line up on the ramp.” The study authors went on to say that only “the most recent generation of stealthy U.S. fighters—the F-22 and the still-to-come F-35—can expect to offer meaningful aircraft-on-aircraft technological advantages over what the PLAAF will bring to the fight.”⁴

There’s a double irony in this trend. Fighters are growing in importance but the principal modernization program for all services – the F-35 – can’t seem to get out of the headlines.

In the crucial years of the Pacific pivot, the F-35 is supposed to bear primary responsibility for ensuring the US and allies can control the air and carry out a range of military operations. The F-35 could constitute 75% of the fighter force as production increases and old aircraft retire. It will pick up all roles such as air combat, precision strike, support for ground forces, NTISR, electronic warfare, and more.

Over the next decade, the Pacific scenarios will place new demands on U.S. fighter forces at all levels.

⁴David Shlapak et al., *A Question of Balance*, (Santa Monica, CA: RAND, 2009), p. 85.

Fighter modernization is a critical component of the rebalance to the Pacific.

The F-35 as an aircraft is now proceeding on pace with its testing. But the program remains under scrutiny. That's due in no small part to the fact that it is really three programs in one, or four programs counting its engine. Its sheer size draws constant questions while events like the Nunn-McCurdy cost breach of 2010 generated talk in press outlets from blogs to newspapers to glossy magazines. Nearly every report on defense strategy and budgets makes mention of the F-35 even when other programs don't warrant a whisper.

For all the discussion of the F-35, precious little of it has focused on its role in the rebalance to the Asia-Pacific region. For that matter, the fighter force as a whole has not been truly re-evaluated and resized in years. Force structure has been trimmed here and there but the bedrock planning and analysis dates back to 1997 for the Air Force and to 2002 for the Navy and Marine Corps.⁵

Aligning fighter modernization and the Pacific pivot is a formidable task given the budget environment and the changing requirements. But it's a task that cannot be put off any longer. The counterinsurgency wars are drawing to a close and represent water under the bridge in terms of force structure recapitalization. The Asia-Pacific strategy makes it high time to review the role of the fighter force and focus in detail on how to ensure the U.S. and its allies retain control of the air in this vital region.

Fighter Force Requirements in the Pacific

Fighter modernization is a critical component of the rebalance to the Pacific. The fighter force as defined here consists of the Air Force's land-based aircraft, the Navy's carrier-based strike fighters, and the Marine Corps' expeditionary fighter aircraft.

For the 21st Century, air dominance is necessary for all types of operations, beginning with routine exercises and humanitarian relief and culminating in the ability to defend bases and strike high-value strategic targets if necessary. What if the U.S. must impose a no-fly zone over disputed islands to calm tensions? What about swinging airpower into action to offset aggression from North Korea? Airpower underwrites those options and many others. Diplomacy, military-to-military cooperation, crisis management and deterrence all

⁵ The Air Force laid out its justification for 1,763 F-35As during the 1997 Quadrennial Defense Review process. The Department of the Navy reduced its quantity to 680 F-35s during a major tactical aviation review in 2002 and has not formally specified the number per variant.

lean heavily on America's air capabilities.

The Pentagon has already begun conceptual work linking air dominance and access.

- **Air-Sea Battle.** Under Air-Sea Battle, the Departments of the Air Force and Navy started collaborating on initiatives to improve communications, platforms, weapons and situational awareness in a joint operating environment. OSD established an Air-Sea Battle office in 2011. "The emergence of A2/AD as a major concern is due to the proliferation of technology that places precise, long-range fires in the hands of potential foes," wrote Navy Captain Philip Dupree and Air Force Colonel Jordan Thomas, directors of the office. "Such weapons include ballistic and cruise missiles, integrated air defense systems, anti-ship missiles, submarines, guided rockets, missiles and artillery, 4th- and 5th-generation combat aircraft — even space and cyberwarfare capabilities. The Pentagon has expanded the Air-Sea battle concept to include the Army, a sound move since the Army remains responsible for crucial segments of ground-based air and missile defense.
- **The Joint Operational Access Concept.** This concept was released in late January 2012 as part of the foundation for the Pacific strategy. It put anti-access and area denial challenges front and center and made the case for joint forces to concentrate on cross-domain synergy. Fulfilling the JOAC will rely heavily on air superiority. The JOAC named the growth of anti-access and area denial capabilities as a top global trend challenging U.S. forces. The cross-domain synergy described by the JOAC actually depends on air dominance. "The ability to ensure operational access in the future is being challenged—and may well be the most difficult operational challenge U.S. forces will face over the coming decades," concluded the JOAC.⁶

**"Allied and American F-35s, whether USAF, USN, or USMC, can talk with one another and set up the distributed operational system."
– General Mike Hostage, USAF**

Both Air-Sea Battle and the JOAC subtly imply that air dominance in the Pacific will be contested in the future.

These are new challenges. Defense strategy scarcely had to discuss threats to air superiority during the 2000s. The last air-to-air

⁶JOAC, p. ii.

challenge, for example, came from the 94-aircraft Serbian fighter force during the 1999 NATO war. Saddam Hussein's Iraq buried its MiGs in the sand rather than face Coalition fighters in 2003.

Had all gone to plan, the right force might already have been in place. The master plan for fighter modernization was laid out fifteen years ago beginning with Secretary of Defense William J. Perry under the Clinton administration. (Perry had previously served as Undersecretary of Defense for Research and Engineering in the 1970s and earned the nickname "the father of stealth" for his foresight in green-lighting a number of black world aircraft technologies.) This plan, of course, was for the Air Force, Navy and Marine Corps to fly common "fighter" and "strike" types built for maximum survivability and with avionics to dominate the information environment. The F-35 was developed in multiple variants for this role.

The Perry plan called for high-rate production and a brisk force structure replacement program. By 2012, the US was supposed to have retired old fighters designed in the 1970s and replaced them with a joint force centered around the F-35 with special roles for the Air Force F-22 and Navy F/A-18EF.

Instead, a combination of urgent operational needs acquisition for Iraq and Afghanistan, program cuts, delayed modernization and slow retirements of older aircraft have left a complicated situation. Now, the fighter force is facing new and different demands and the defense program has gradually strayed far from the Perry plan. For example, the baseline scenario of the defense of North Korea depends on the air component to surge sorties against North Korea's hefty army and integrated, if older, air defenses. Scenarios for deterring – or facing off with – China could place a wide range of demands on the fighter force. China has a top-of-the-line integrated air defense centered on advanced surface-to-air missiles. For the first time in decades, there is also a real prospect of "red" air opposition. Add to that the increased threats to land bases and aircraft carriers and the combined threat is serious and multi-faceted.

The Pacific pivot makes recalculation unavoidable. The Quadrennial Defense Review (QDR) of 2010 started the process by drawing attention to anti-access threats from surface-to-air missiles. "U.S. air forces in future conflicts will encounter integrated air defenses of far greater sophistication and lethality than those fielded by ad-

Scenarios for deterring – or facing off with – China could place a wide range of demands on the fighter force.

versaries of the 1990s,” the report acknowledged. “Proliferation of modern surface-to-air missile systems by Russia and others will pose growing challenges for U.S. military operations worldwide,” the 2010 QDR also noted.⁷

However, QDR 2010 did not speak to the return of a lethal environment from “red” air. To take just one example, the number of fighters needed to deal with enemy aircraft across a broad battle area has not been factored into the joint strike and fighter requirements for the better part of two decades. The fighter force is not yet rebalanced to cope with the emerging threats over the long term.

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Scenarios for the Fighter Force

To judge what additional requirements may stem from the Pacific pivot, it’s important to take a longer view and frame the 2020 time period. Scenario-based planning functions as a way to anticipate how threats may change and what the U.S. must do to meet them.

Several scenarios are likely to drive the fighter requirement over the next decade. They are:

- **Countering North Korean Aggression.** If North Korea invades, U.S. fighters must be in place to attack the opposing force, provide CAS and interdiction as well as fly offensive counter air missions to crush air defenses.
- **Access in the South China Sea.** A confrontation over islands such as the Spratlys requiring a show of force, persistent ISR, open ocean surveillance, and securing the commons.
- **Air Battle over Taiwan in 2020.** A Taiwan straits crisis developing into an intensive but contained battle for control of the air with each side striving to control escalation.
- **Extending Ground Attack.** The Taiwan scenario extends to limited strikes on the mainland to deny use of airfields, missile launch sites or other offensive capabilities.
- **Challenges in the Second Island Chain and Beyond.** After 2020, China’s forces are on track to be capable of power projection operations. U.S. forces and allies may be defending their bases and fleets at multiple locations.

⁷QDR 2010, pp. 31-32.

These scenarios are only sketches of possible outcomes that illustrate where current trends in Chinese military developments and policy could lead. The Korean scenario shows the value of steady force replacement and modernization for air-delivered firepower in a longstanding commitment. After that, the next scenarios all assess various potential outcomes of the rise of Chinese military power and point to escalating problems with assuring control of the air. They aren't a prediction, but they are a sobering guide to what the U.S. should prepare to face – and to deter.

Scenario 1 **Countering North Korean Aggression**

North Korea may be the most dangerous flashpoint in the world. The US commitment to defending South Korea dates back to the end of the Korean War in 1953. Recently, it has stood as the high-end, stressing case for the Pacific and an iconic “major theater war” scenario. It's also a prime reason why U.S. defense strategy consistently maintains the capacity to swing from one contingency to another. No matter where else U.S. forces are engaged, national strategy has for decades made sure that reinforcements can be available should conflict break out on the Korean peninsula. Actually, the original plan for fighter modernization was crafted with the Korean scenario (plus one other) in mind.

For the Korea scenario, fighters immediately swing into action to counter the North's million-man army and must deal with overlapping rings of older surface-to-air missiles to fight most effectively. The scenario is heavy on air support to ground forces, both in the form of interdiction and “indirect fires” ahead of the battle edge as ground forces clash. North Korea is likely to have few fighters but significant ground-based air defenses.

How much fighter support will be needed? The most recent comparison dates back ten years to the major combat operations phase of Operation Iraqi Freedom. The main phase of operations lasted from March 19 through April 20, 2003. Iraq in 2003 had a much smaller ground force than does North Korea. However, the Iraqi force was highly mobile. A quick look back at 2003 sheds light on how fighter and strike aircraft are apportioned in a major theater war and serves as a guideline for fighter and strike force sizing now.

Countering North Korean Aggression	Response
<p><i>Timeframe: 2015</i> U.S. and ROK forces lead rapid counterattack of North Korea forces.</p>	<p>U.S. and allied fighters surge and engage with maximum sortie generation for interdiction of ground targets.</p>

For the Iraq campaign, the joint force commander Army General Tommy Franks focused fighter and strike aircraft primarily on hitting enemy ground force targets. To meet these goals, Combined Forces Air Component Commander Lieutenant General T. Michael Moseley, USAF, apportioned 14% of the strike effort to counter-air targets and the remaining 85.9% of the strike effort to countering Iraqi ground forces. A full 50% of the strike effort was committed to supporting the ground advance against the Iraqi Republican Guards and Army and the conduct of security and stabilization operations on the march up to Baghdad. Significant portions also went to supporting SOF forces, and to suppressing Iraqi short and medium-range missile launch systems.

Like North Korea today, Iraq in 2003 had an integrated air defense based primarily on older Soviet-era systems. The system was netted and extensive but lacked the long ranges and sophisticated detection capabilities of the SA-10 class and above. Iraq’s air defenses had been attacked steadily by Coalition forces operating under UN mandates for a year prior to March 2003.

Despite this, Baghdad was still covered by a “super MEZ” (missile engagement zone) as Pyongyang is today. It took the Coalition about ten days to put the Baghdad super MEZ out of business. The Iraqis were nonetheless able to launch 2,884 surface-to-air missiles of various types such as SA-2, SA-3, SA-6 and Rolands against Coalition aircraft in a 25-day period. The peak came on day 15 of the war when 190 SAMs were launched. None hit; most were unguided. The point is that the Air Force estimated 66% of these attacks were from unlocated SAMs despite the intensive effort to find and neutralize them.⁸

North Korea’s main advantages in the scenario center on the size

⁸ Source: USAF. During the Kosovo campaign in 1999, the Serbs launched 894 SAMs in 78 days peaking on Day 39 with 43 launches.

of its armed forces. Artillery and other weapons are thought to be concealed in a cave system. According to classic Lanchestrian equations, an attack succeeds when forces are at a ratio of 3:1 in favor of attacker. North Korea's large army offers this advantage. UN forces, then, have long rested their strategy on heavy use of air interdiction to assist in turning back the attack. Repulsing an attack from North Korea in the year 2015 would require some apportionment to counter-air tasks along with a heavy apportionment of between 50% and 75% to the CFLCC.

Fortunately, UN forces have several advantages. The Republic of Korea forces are highly trained and U.S. forces are already in position. Aircraft carriers do not face a significant naval threat and can operate close to the peninsula providing supplementary airpower.

Countering North Korean aggression requires a surge of fighter forces to provide sorties within the first days of the conflict. Peak surge operations to blunt the attack will demand use of all available aircraft. A-10s, AV-8Bs, F/A-18EFs, F-16s and F-15Es can deliver significant firepower against ground targets. Specialized assets like the F-16CM, F/A-18EF and F-35s will provide capability for destruction of enemy air defenses. F-15s and other aircraft may fly defensive combat air patrols to protect AWACS, E-2D, tankers, Rivet Joint and so on but the CAPs can be comparatively lightly manned as they will scan only for a few aircraft.

How many fighters are needed? In Operation Iraqi Freedom, the U.S. and UK employed a total of 721 fighters: 293 USAF, 130 USMC, 232 USN and 66 from Britain's Royal Air Force. About 465 were land-based forces. This force supported a two-division attack plus special operations forces active throughout a wide swathe of Iraq.

Korea presents a different problem of concentration with larger forces. The target set and finite sortie length and aircraft payload will demand hundreds of sorties per day. Sustaining 24-hour operations in the intensive opening phase could take a force about double what was employed in Iraq in 2003. For example, doubling the number of land-based fighters would place the marker at 930 fighters for a Korea scenario. Four carriers might again add to the fighting force with upwards of 250 fighters providing a total of 1180. The Korea case alone shows why fighter modernization is an import-

ant pillar of the Pacific strategy. The current USAF requirement is for 1900 total fighters in the inventory (TAI) with 1100 primary aircraft available (PAA) ready for global deployment for all warplans and CONUS contingencies. As sketched here, the Korea requirement alone could soak up most of the current USAF fighter force. Naturally, the USN and USMC strike fighters can contribute effectively. However, the point is that the first crucial weeks and months of a full-scale conflict in Korea would leave little else for other global force commitments – or for increasing the US homeland security posture.

Sheer numbers are not the only consideration. As air defenses improve, older U.S. fighters will be more vulnerable and will take losses. Overall capability could drop to the point where intervention becomes far more risky and chances of success in short order diminish.

Scenario 2

Access in the South China Sea

China stepped up its activities in the South China Sea in 2012. One move was adding troops and improving a landing strip in Yongxing Island in the Paracels. China has contended that Vietnam, the Philippines and Malaysia are illegally occupying many of the forty-plus small islands in the South China Sea. In December, officials from China's Hainan province announced "plans to enforce its claims that it has sovereign rights over much of the sea, which includes dozens of islands that other countries say are theirs."⁹ On top of this, China's biggest naval fleet is now its South China Sea fleet.

Over the next decade, there's a growing prospect of confrontation among air and naval forces over the territorial claims to these small, disputed islands. While hopefully it can be avoided, this is a scenario for which U.S. forces should be well-prepared.

The Spratlys pose an interesting wargaming problem. China's air forces are not far from being able to attempt to impose control of the air. The PLAAF presents the first true fighter adversary that the U.S. has faced since the end of the Cold War. China's air force is far from parity with the U.S., but more than ready to make the U.S. and its allies pay a high price to keep air superiority in the far reaches of

As sketched here, the Korea requirement alone could soak up most of the current USAF fighter force.

⁹Jane Perlez, "Alarm As China Issues Rules for Disputed Area," *New York Times*, December 1, 2012.

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the Pacific. By 2020, the PLAAF could be in a position to generate a consistent air presence over the Spratlys (and perhaps, in larger scenarios.)

As it turns out, regional allies are well aware of the tactical problem. “Should a shooting war break out over the disputed Spratly Islands, China could easily achieve air and sea superiority due to the increased focus Beijing has given to improving its force projection capabilities in the West Philippine Sea and South China Sea,” noted a 2011 report in *The Philippine Star*. “China’s multi-role fighters can reach as far as Metro Manila,” the article warned.¹⁰

In this scenario, the U.S. could take the lead in imposing a Northern Watch-style operation.¹¹ Reconnaissance from high-altitude Global Hawk RQ-4s and other assets would be essential to tracking the latest positions of Chinese forces. The U.S. and partners would seek to damp down Chinese flights in the area and to protect air and naval surface forces.

Opposing this freedom of action would be Red air and naval forces. The advanced capabilities of the PLAAF could constrain options. For example, U.S. and allied forces would have to contend with Chinese naval forces capable of establishing long-range air defenses at sea. Russia developed a sea-based version of its S-300 surface-to-air missile prior to 1990. China adapted a variant known as the HHQ-9 for deployment on its Type 051C guided missile destroyers. Essentially, this gives the PLA Navy the ability to roam international waters defended by a SAM with a range reported at up to 93 miles. This is a substantial area denial scenario and well within reach for current Chinese capabilities.

¹⁰ “China Has Air Superiority,” *The Philippine Star*, June 15, 2011.

¹¹ Northern Watch was the patrol of the no-fly zone over Northern Iraq from 1992 to 2003.

Sea Area Denial	Response
<p><i>Timeframe: 2020</i> Assume that in a crisis, China positions guided missile destroyers with HHQ-9s near contested islands and attempts to deny access to international forces. Facing down this claim could fall to a U.S. Navy carrier strike group. F-35Cs on the deck would be essential. The Chinese frigates could attempt to establish lock-out of U.S. and international aircraft by placing the guided missile frigates in a formation that extends to 200 miles, for example. To regain access, U.S. forces might seek out and destroy the guided missile frigates.</p>	<p>An F-35C can penetrate much further against the SAM-carrying frigate and get close enough to launch a lethal strike. In contrast, the non-stealthy F/A-18EF is at a disadvantage. The F-35C enables the carrier strike group to push its attack much further out. This is important in an environment where the Chinese may be attempting to target the aircraft carrier and other ships in its strike group.</p>
<p><i>Timeframe: 2020</i> Add in China's aircraft carrier with a deck complement of up to 50 J-15 fighters. The carrier puts to sea and operates small day and night CAPs with periodic launches of four-ship packages.</p>	<p>With a Chinese carrier present, the F-35 is needed to hold the frigates at risk while also pushing the air battle out away from the U.S. carrier. Legacy fighters might participate as final close-in defense, but it is the F-35 that delivers hefty advantages in this high-stakes scenario.</p>

No doubt U.S. ships, submarines, and land-based aircraft will be going after the Chinese guided missile frigates, too. In fact, that coordination is the subject of intensive work by the Navy and Air Force on Air-Sea Battle concepts.

The U.S. might opt for fighter sweeps at regular intervals to assert air superiority. Sweeps would use fewer forces than round-the-clock operations. However, U.S. forces would still need three aircraft carriers plus augmentation from land-based air to maintain air superiority. One of the three carriers would become the night operations carrier, while the other two operated during the day, provided emergency recovery capacity, and allowed one carrier to periodically suspend flight operations for replenishment.

In this scenario, the F-35C would deliver a substantial advantage to the force mix. The F-35Cs could operate closer to the Spratlys

and to Chinese naval vessels in the area, and provide tactical augmentation to other air wing aircraft.

Scenario 3

Air Battle Over Taiwan in 2020

The U.S. is committed by treaty to the defense of Taiwan should conflict arise. Many analysts have written that the Taiwan Strait crisis of 1995 to 1996 provided a turning point for China's military modernization. In that crisis, U.S. Navy carriers deployed near the Taiwan Strait as a show of force in response to Chinese missile tests which appeared to threaten Taiwan.

According to Amy Chang of the U.S. China Commission, the crisis "catalyzed investment in the long term modernization and professionalization of China's armed forces. If there had been uncertainty before as to what the United States might do in a Taiwan scenario, this seemed to be a clear statement that U.S. forces would intervene—and that the PLA lacked effective capabilities to deter or defeat them," wrote Chang in a recent report.¹²

The modernization of Chinese airpower has turned older wargames upside down. In the past, the defense of Taiwan was relatively straightforward. Chinese military modernization introduced new variables like missile attacks on airbases, fighter effectiveness, and so on. The combination tilted some wargame analysis in favor of China. For example, in 2009 RAND assessed the implications for the battle for air superiority in the Taiwan Strait. The study repeated a scenario from 2000 but with different forces – and different results. The RAND study assumed China would attack to suppress airbase operations and destroy many aircraft on the ground. The fresh assumptions led to results that were practically unthinkable a decade before.

"Our analysis indicates that China's ability to suppress or close the ROCAF's bases could give the PLA Air Force (PLAAF) an almost overwhelming numerical advantage that—coupled with the rough qualitative parity that now exists between the two sides—could allow China to attain air superiority over Taiwan and the strait," concluded a RAND team led by David Shlapak. To underline the point, the

The modernization of Chinese airpower has turned older wargames upside down.

¹² Amy Chang, Indigenous Weapons Development in China's Military modernization, U.S.-China Economic and Security Review Commission Staff Research Report, April 5, 2012, p. 27.

RAND team said: “The danger to both ROCAF and USAF operations in the Taiwan Strait is sufficiently grave that a credible case can be made that the air war for Taiwan could essentially be over before much of the Blue air forces have even fired a shot.”¹³

The scenario discussed here assumes for analytic purposes that the first phase is a battle in the air only. In this case, the conflict escalates as the PLAAF challenges a no-fly zone set up by the U.S. and allies. Establishment of no-fly zones has become arguably the most popular form of international peacekeeping efforts when conflict is at hand and nations desire to limit intervention. The focus is more intense because control of the air serves to clear the way for territorial possession by Red or to re-establish deterrence, an objective for Blue.

Both Red and Blue sides hold back from attacking airfields for several days. Control of the air rests on exchange ratios between the fighter forces. In particular, the success of beyond visual range attacks and “first shot, first kill” drives the exchanges. Several assumptions apply.

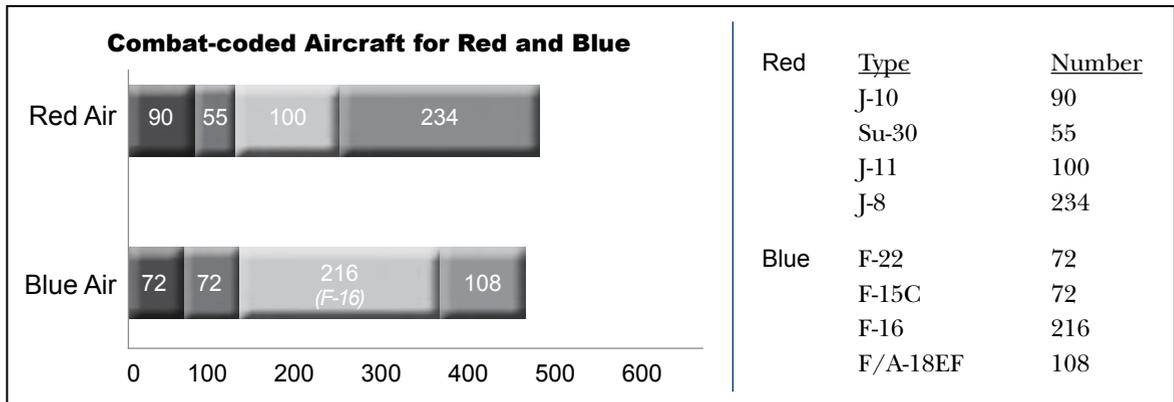
- First, assume strategic warning of a looming crisis. Tensions escalate over a period of weeks. The U.S. deploys advanced fighters to Taiwan and other theater bases to help deter the crisis and improve advantages should war occur.
- Second, it’s no longer necessary for the “red” adversary to use an early, overwhelming barrage of ballistic missile attacks and fighters to tilt the balance. China may be attempting to coerce Taiwan through a show of force rather than opening with massive attacks. This scenario posits that both sides hold back from airfield attack in the first instance as an attempt to control escalation. It also assumes that carrier strike groups are not targeted at this time.
- Third, the PLAAF of 2020 will be capable of challenging for air superiority without having to cross the threshold of simultaneous attacks on Japan, Taiwan and aircraft carriers.
- Fourth, Taiwan is not the only island of interest. The Senkaku/Diayou islands in the East China Sea were the source of dispute between China and Japan in summer 2012.¹⁴

¹³ David Shlapak et al., *A Question of Balance*, (Santa Monica, CA: RAND, 2009), p. xvi.

¹⁴ According to the 2012 Report of the Senate U.S.-China Commission: PRC Foreign Minister Yang Jiechi, in his 2012 address to the United Nations (UN) General Assembly, insisted that Japan “stop all activities that violate China’s territorial sovereignty” and that the purchase of the islands “can in no way change the historical fact that Japan stole Diaoyu and its affiliated islands from China and the fact that China has territorial sovereignty over them.” Report, p. 134.

The eruption of an air battle is a conceivable, even reasonable possibility when both sides are attempting to impose some restraint. The air battle involves identified combatants only; they fight for a clear but limited objective. No sovereign territory is attacked. It's all the more interesting because it pits top-line forces against each other and accurately portrays attrition on both sides. Prevailing in the air battle then becomes a major centerpiece of deterrence.

Air Superiority Battle: Combat Air Patrols	Response
<p><i>Timeframe: 2020</i> U.S.-led forces attempt to establish no-fly zone combat air patrols over the contested Taiwan Strait. After one day of operations, the PLAAF sends large force packages to disrupt the combat air patrols. Missiles are fired and an air battle ensues. Each side fights it out in the air without attacking air bases.</p>	<p>U.S. and allied fighters engage PLAAF fighters and maintain maximum sortie generation from land and sea bases.</p>



The U.S. force is based on a group of 78 aircraft needed to maintain combat air patrol. Aircraft included are 12 F-22s, 12 F-15Cs, 36 F-16s, and 18 F/A-18EFs. Projecting forward the F/A-18EFs calls for 9 squadrons of 12, based on between three and six aircraft carriers (depending on Navy operating concepts.) Each tranche of 78 aircraft provides air superiority in 4-hour shifts. Six identical tranches maintain 24-hour coverage in the crisis. Total numbers are shown

in the chart.

The scenario assumes the PLAAF uses all the combat-coded fighters in the current inventory capable of deploying the advanced PL-12 missile. The numbers are 479 for the PLAAF (75% rounded from an inventory of 776) and 468 for the U.S.

If Red and Blue aircraft engage, the battle stacks up as a fast and lethal war of attrition. The battle is blocked out in large force engagements as PLAAF fighters try to establish mastery around the Strait and the U.S. and allies try to deny them that control.

F-22s execute high-altitude sweeps. F-15s conduct slashing attacks from multiple altitudes. F-16s and carrier-based F/A-18EFs have also been deployed forward. In this case, the F-22s enjoy a favorable exchange ratio. However, they form only a small a part of the force. Overall, the ratio is barely over 2:1 in favor of Blue.

Table 1: Notional Kills and Losses Without F-35

	Number	Exchange Ratio	Total Kills	Losses
F-22	12	5:1	60	12
F-15C	12	2:1	24	12
F-16	36	1.5:1	54	36
F/A-18EF	18	1.5:1	47	18
Grand Total			165	78

The principal change to make in the force is to add more stealth. The application of stealth to air combat fighters provides advantages that pay off in simulations of conflict with a peer air force. The prize is the ability to take the first shot. “In the majority of cases, the side taking the ‘first shot’ in an air-to-air engagement seizes the initiative by forcing opponent aircraft to react against the missile(s) to prevent a kill,” noted one author. “A missile in the air generally attracts the attention of the pilot in the target aircraft often causing him to forget about the firing aircraft or firing his own weapons. For this reason, first shot can be critical even if not successful.”¹⁵

¹⁵ D.R. Denhard, *Theater-level Stochastic Air-to-air Engagement Modeling via Event Occurrence Networks Using Piecewise Polynomial Approximation*, Air Force Institute of Technology, PhD Dissertation, September 2001.

A better exchange ratio enables the U.S. and allies to inflict more attrition on the PLAAF. The next chart swaps the F-16s and F/A-18EFs for F-35s. The kill ratio is readjusted to 3:1 for the F-35 due to its stealth and sensors.

Table 2: Notional Kills and Losses Improve With F-35

	Number	Exchange Ratio	Total Kills	Losses
F-22	12	5:1	60	12
F-15C	12	2:1	24	12
F-16	36	3:1	108	36
F/A-18EF	18	3:1	54	18
Grand Total			246	78

This time, the force package with F-35s is 86% more effective.

The assumptions in these tables reflect simple exchange ratios. Doubtless others would choose different assumptions. However, two main points stand out here as they would in any modeling of this scenario. First, an all-out battle for control of the air will lead to higher losses than the U.S. has seen in decades. Second, stealth and fifth-generation characteristics such as advanced radar make a significant difference. In fact, these characteristics become critical for a credible shot at retaining air control even under the burden of those losses. Of course, deterrence remains paramount. Conventional deterrence in this scenario depends on being able to hold control of the air.

For the purposes of this paper, the scenario makes a useful way to gain insight into the potential battle for air control in extended operations. Future success in that battle will rely on bringing more F-35s into the force.

Scenario 4
Extending Ground Attacks

Control of the air in and around the Taiwan Strait has long been thought to be essential either to invade or to defend the island. In

An all-out battle for control of the air will lead to higher losses than the U.S. has seen in decades.

this scenario, the PLAAF will be in position to be highly selective about where and when it engages. China in 2020 has the option to set up asymmetric air battles defending major targets, much as the North Vietnamese did long ago.

There is a second element to this scenario. Assume that U.S. strategy calls for punching through air defenses to attack and hold at risk targets on the mainland. If a crisis escalates, an international coalition may attempt limited attacks to stop China’s ability to control the air, for example. Selective strikes on the Chinese mainland may be part of the contingency plans. In particular, the U.S. might opt for strikes against a limited target set including known missile sites and Chinese airfields used in attacks across the Strait.

Air Superiority and Strike	Response
<p><i>Timeframe: 2020</i> U.S.-led forces target a set of five airfields and missile sites, attacking in sufficient numbers to get through both Chinese fighters and air defenses. Mission packages will launch from island bases and aircraft carriers. The strike aircraft will then cross open ocean and refuel before heading to their targets. However, China’s PLAAF will have time to detect the direction of the attack and divert fighters to intercept.</p>	<p>Mission packages will fight through the PLAAF interceptors then egress into targets covered by overlapping air defenses. The battle will concentrate along major air corridors. In this case, there is no option for crossing Chinese airspace from multiple directions – a key feature of how bombers planned to tackle the Soviet Union’s airspace during the Cold War.</p>

The key for this part of the battle is to contend with China’s surface-to-air missile defenses and fighters.

Under a launch on warning assumption, the U.S. and regional allies retain a viable air component. Both land bases and aircraft carriers preserve strike aircraft. It also means the Red adversary cannot count on missile strikes to knock out air forces; the PLAAF must remain prepared for battle in the air. Indeed, with launch on warning the PLAAF must maintain forces with strategic depth to defend home field airbases and deeper targets.

Fighters can bring many assets to the battle. Decoys such as the Miniature Air Launched Decoy (MALD) can mimic the electronic

At present, the US has few assets that can complete missions against advanced integrated air defenses with a reasonable probability of success.

presence of a strike aircraft on enemy radar sensors. In this environment, survivability is a matter of numbers: how many surface-to-air missiles or fighters line up valid shots? Losses are to be expected. Stealth, speed and altitude will help offset them. However, PLAAF fighters will be able to attack incoming U.S. aircraft at several places en route and to harass them again after they complete their missions and turn for home bases. U.S. forces will have to mass for protection and to put enough aircraft in the air to ensure that a sufficient number can complete the mission. Against this, China can vector dozens of fighters for the intercept.

If there is one vital variable, it could be how well U.S. fighters do in holding off Chinese fighters and clearing the area to carry out strikes. An air battle with China could produce significant losses. Consider the consequences of failure. If Chinese fighters disrupt combat air patrols or maul strike packages, what is the next move for the U.S. and its allies? The choices would be to back off or to return the next time with greater force. Another option is to attack the Chinese air force at its airfields. The probability of success diminishes with losses. The control of escalation – always cherished in a crisis – could become difficult, too.

The scenario of limited attacks on Chinese targets calls for enhanced survivability. At present, the US has few assets that can complete missions against advanced integrated air defenses with a reasonable probability of success. These include the small fleets of the B-2 bomber and the F-22 stealth fighter. Adding the F-35 significantly elevates the probability of success against this target set. Once again, the deterrent value of this force enhancement is particularly vital.

Scenario 5 **Challenges in the Second Island Chain and Beyond**

The final scenario set asks the question: what options are available if China aims to project power well beyond its shores in pursuit of foreign policy goals? Chinese military capabilities are on a trajectory to advance to the point where that nation is capable of mounting offensive, power projection operations. Whether they come to pass is hard to say – but it's risky to discount the potential.

Sometime after 2020, Chinese air and sea forces could mount operations at various locations. The emphasis would be on protecting U.S. fleets and bases, countering airborne attack and attacking ships at sea. All these operations might go on simultaneously and place heavy demands on the fighter force structure in the Pacific theater.

One example might be the use of bombers with cruise missiles to feint in multiple directions. China has the option of combining its most advanced H-6 bomber variants with air-launched DH-10 cruise missiles. The missiles have a theoretical range of close to 2000 nm.¹⁶ Guam and all other theater bases would fall in range of the H-6 bomber given those specifications. Countering an attack would demand hefty combat air patrols of fighters.

Bombers Armed with Cruise Missiles

One of the most difficult scenarios would be discerning intentions and defending against a possible attack by bombers with cruise missiles. China's H-6 bomber is an old design derived from the Soviet Union's Tupolev-16 Badger bomber. The total build was about 150 H-6 bombers shared among the PLAAF and PLA Navy. A few were reportedly converted to air refueling capability in the mid-1990s.

By itself, the 1950s-era technology of the H-6 is not impressive. However, an H-6G bomber first tested an extended range, air-launched anti-ship missile over a decade ago in 2001. At least one variant, the H-6K, can deliver six DH-10 cruise missiles or carry 6-8 long-range air-to-air missiles primed for hunting airborne early warning aircraft such as the E-3 AWACS and E-2C/D Hawkeye.¹⁷

The DH-10 cruise missile shows Chinese military air attack development in microcosm. The missile was first deployed in small numbers in 2008. By 2009, the number of deployed DH-10s was estimated at up to 350 missiles. Current assessments suggest that China has between 200 and 500 DH-10 missiles with a 1500 nm range. What portion of that inventory consists of air-launched cruise missiles is not known.¹⁸

Still, this growing capability gives China the ability to create havoc in the air over the Pacific. Estimates suggest the H-6M carries four anti-ship missiles, while the H-6K carries six cruise missiles. It's

¹⁶ Jan M. van Tol, Mark A. Gunzinger, Andrew F. Krepinevich Jr. and Jim Thomas, *Air-Sea Battle: A Point of Departure Operational Concept*, Center for Strategic and Budgetary Assessments, Washington, D.C., May 18, 2010.

¹⁷ China Threat Blogspot, "H-6K: China is continuously improving H-6 for Air-Striking Platform," September 2, 2009.

¹⁸ Global Security "DH-10/CH-10/CJ-10 Land-Attack Cruise Missile Hong Niao/Chang Feng/ Dong Hai-10," <http://www.globalsecurity.org/wmd/world/china/lacm.htm>.

likely that no more than a few dozen are modified to the H-6K and H-6M variants. The catch is that China probably needs no more than a handful to present U.S. forces and allies with a major air intercept challenge. The choices would be much more difficult during a period of tensions if the H-6s were spotted with weapons on their under-wing pylons.

Sea Area Denial	Response
<p><i>Timeframe: 2020</i> One flight of two H-6 bombers launches from a coastal base to demonstrate presence during a U.S.-led multinational exercise. Whether they carry anti-ship, land-attack, or long range air-to-air missiles might not be known.</p>	<p>At a low level of strategic tensions, the intercepts would unfold in ways similar to the regular Russian and U.S. encounters over Alaska.¹⁹</p>
<p>In an unusual move, three flights of H-6 bombers launch from coastal bases in multiple directions. Once the bombers crossed a certain point, the primary desired response would be air intercept.</p>	<p>First to be potentially vulnerable would be U.S. Navy ships operating near China. U.S. fighters from Korea, Japan, Guam or allied bases could get the call to run intercepts as well.</p>

The risk from the bombers comes primarily from the missiles they carry and uncertainty as to intentions and targets. The truly devilish prospect would be combining feints against both sea and land-based forces at the same time.

Air power projection operations by China would have to be met by fighters able to determine intentions and perform intercepts. Even practice operations would soon be deemed too potentially dangerous to ignore. The result at high tensions could be 24/7 combat air patrols (CAPs) along all major avenues of egress for the H-6s or near points of high value, such as island bases within cruise missile range.

Air attack of maritime targets. Under a full force projection scenario, the U.S. might also find maritime targets – ships – in the tar-

¹⁹Russian Bear bombers and U.S. F-22s routinely meet, take snapshots of each other from the cockpit, and return home to debrief.

get set. The process would begin with tracking and include the special geometry and weapons most effective for attack at sea. Aircraft proved lethal and effective against ships and submarines in past conflicts. In this case, maritime interdiction would add to the demand for stealth fighters in the theater.

Base Vulnerability: A Gamechanger?

Before summing up the implications, there is one major caveat to discuss. Could airbase vulnerability undercut the whole operating concept?

Recent studies have suggested that the Red adversary's opening tactic may be to launch hundreds of short-range ballistic missiles against airfields in an attempt to cut runways and destroy aircraft on the ground.

The 2009 RAND study devoted several chapters to analysis of China's ability to suppress Blue sortie generation by cutting runways.

Similar analysis followed from CSBA. China's ballistic and cruise missiles launched at forward bases "will force U.S. aircraft to operate from distant bases and will greatly reduce their sortie generation rates," wrote CSBA analyst Mark Gunzinger in a 2010 study of the demand for long-range strike. "Operations in the Western Pacific region would be particularly problematic," he added, because bases "are either so close to China (e.g., Kadena, Kunsan, Osan) that they are under threat of devastating air or missile strikes, or so distant (e.g., Andersen AFB, Diego Garcia, and RAAF Base Darwin) that they are of limited utility to a force primarily comprised of short-range aircraft," he concluded.²⁰

Granted, China has discussed airbase attack as part of air superiority. Chinese military doctrine stated: "If an attack is aimed at disrupting the enemy air strike plans, one should target the enemy's command and control systems and fuel and ammunition supply systems; if it is aimed at degrading an enemy aviation corps group to reduce the pressures from its air strikes, one should target the aircraft parked on the tarmacs of airports housing the enemy's main bomber and fighter-bomber aviation corps."²¹

Land bases are not the only vulnerabilities. China attracted plen-

²⁰ Mark Gunzinger, "Sustaining America's Strategic Advantage in Long-Range Strike," CSBA, 2010, p. 18.

²¹ Roger Cliff, "The Development of China's Air Force Capabilities," Testimony to U.S.-China Commission, May 20, 2010, RAND, CT-346, 2010.

ty of attention with its claims that its DF-21D missile could hit a moving ship at a range of 1700 miles. No less a source than the *Wall Street Journal* speculated that the DF-21D might spell the end of the aircraft carrier.²²

What the work by RAND, CSBA and others quite reasonably points out is that friendly “blue” fighters have to be in the air in sufficient numbers to be effective. Ultimately the contest for air control over the Taiwan Strait – or any other disputed island region – is a battle of attrition where one side keeps the upper hand.

The base vulnerability discussion thus far has rightly focused attention on rapidly growing Chinese missile arsenals and the need to consider tactics for U.S. operations. However, the discussion has also followed a fairly narrow channel as it largely assumed that the U.S. and China would trade major blows right away. Picture Chinese missile strikes on overstuffed bases, with the U.S. standing off and retaliating on deep, distant targets with long-range strike assets. This frightening scenario was a very useful premise for wargames, in part because it started to lay out the dimensions of the threat that China could mount. To date, equally detailed work on Blue options has not emerged.

Yet there are significant points – some strategic and some tactical – that suggest an all-out missile strike is not the only option available to China in the event of war. Nor is it necessarily the most clever one the Red adversary could choose.

Consider first the strategic calculations. The first point is pure logic: why would China press on with its air force modernization, the J-20, the J-31, its aircraft carrier and other projects if the existing missile inventory was sufficient to accomplish the full suite of political and military objectives? Chinese doctrine suggests weaving air, space, naval and information capabilities together. Clearly, Chinese experts are thinking about a slate of options much broader than barrage attacks.

Another point centers on the exchange ratio. It could apply to any nation and China is no exception. China’s ballistic missiles are a formidable but limited asset. “The single-use nature of ballistic missiles means that they have important disadvantages relative to air-

²²Julian Barnes, “China Takes Aim at U.S. Naval Might,” *Wall Street Journal*, January 4, 2012.

craft,” found RAND analyst Roger Cliff. “China’s entire inventory of conventional ballistic missiles, for example, could deliver about a thousand tons of high explosive on their targets. The USAF’s aircraft, by comparison, could deliver several times that amount of high explosive every day for an indefinite period of time.”²³ Of course, so can China’s combat aircraft. Cliff pointed out that the combination of aircraft and missile forces is more likely to be effective than either alone.

There is also a question of effectiveness. From China’s perspective, its conventional ballistic missile arsenal alone is not enough to guarantee a shut down of U.S. forces operating in the Pacific.

The U.S. and allies have many options for “fighting through” attacks on bases. Missile-bristling adversaries were par for the course in the Cold War. U.S. fighter forces stationed in Europe prepared to operate under degraded airbase conditions. In the process, U.S. forces compiled a wealth of experience while facing the nearby Warsaw Pact and its thousands of short-range missiles. For example, some wargames assume missile attack with cluster munitions will catch aircraft parked on runways. Few have taken into account the once-standard tactic of launch on warning, for example. Dozens of air bases learned to flush aircraft quickly to spare them from attack.

NATO has already addressed the problem of warning. An upgraded shared early warning system for missile attack was put in place in 2002 for NATO partners. The shared early warning system provides NATO commanders and air operations centers with a real-time picture of any missile events, including refined trajectories and potential impact areas.

When fighters get airborne and escape, much depends on what happens after the missile attack. The USAF Red Horse civil engineering teams frequently set up mobile arresting systems where fighters like the F-16 drop their tail hook to catch an arresting wire. (Both the Blue Angels and Thunderbirds often employ such systems while on performance tours.) The land-based systems use a modified B-52 braking system to slow the fighter rapidly. Expeditionary systems can be rapidly installed. By “taking a cable,” fighters can recover on shorter runways when damage is present or use alternate sites. This

The U.S. and allies have many options for “fighting through” attacks on bases.

²³Roger Cliff, “The Development of China’s Air Force Capabilities,” Testimony to U.S.-China Commission, May 20, 2010, RAND, CT-346, 2010.

is just one of the tactics for coping with damage at airbases. Suffice it to say the USAF, USN and USMC have long dealt with this problem and should not be docked simply on the basis of a missile nose count.

While base vulnerability is a very serious issue, considering it in isolation or selecting it as a preferred strategy does a disservice to the wider strategic debate. Above all the ballistic missile threat is not a reason to drastically cut fighter presence or requirements. The problem is much, much bigger than ballistic missile attack. A growing PLAAF and the development of aircraft carrier aviation will give China many options about how and where to set up area denial zones over the next decade should it choose to do so.

Implications of the Scenarios

Glimpses of the operational challenges in an extended peer conflict suggest several tactical lessons that should influence fighter modernization.

The carefully-tailored air forces of China are approaching the point where they could be used to create significant tactical and operational problems for U.S. forces. If they can't counter this scenario, how credible is deterrence in the region?

From the joint force commander's perspective, stability in the Pacific calls for tools that can react fast and without escalation. Fighters are at the top of the list because they provide the flexible overwatch and defensive combat air patrols for lower levels of conflict, and when necessary, reach all the way up to assured attack operations. Several implications for the U.S. fighter force stand out:

- Formidable airpower is the first line of deterrence across all scenarios, but especially those at the top end such as countering North Korean aggression and defending the Taiwan Strait.
- Combat attrition is back as a real factor in operations and force planning.
- Stealth improves overall exchange ratios and permits the U.S. to operate with a smaller, but high-quality force.
- Missiles and weapons matter. The F-35 should be fitted for maximum quantities of air-to-air and other weapons, including those designed for interdiction of maritime targets.

The fighter force should be postured to deal flexibly with the potential for Chinese power projection in the 2020 timeframe and beyond.

- Only stealth aircraft will be capable of persistent attacks on limited targets such as airfields and missile launchers in the integrated defense environment of the Chinese mainland.
- Concepts for “fighting through” under attack are essential for land-based forces and carriers.
- The fighter force should be postured to deal flexibly with the potential for Chinese power projection in the 2020 timeframe and beyond.

The fighter force at hand and the F-35s coming off the line are just about all the U.S. has to bolster its air options in the Pacific for the next decade. Scenarios like these will no doubt be fleshed out in studies and wargames as the pace of analysis for the Asia-Pacific region picks up.

The brief sketches here indicate the need to present a fighter force to meet a range of contingencies in the Pacific, and therefore contribute to deterrence and defense. For the next decade, adding capability to the fighter force both land and sea-based is perhaps the single the most effective way to shore up the balance of power in the Pacific. A capable fighter force takes away adversary options while increasing alternatives for U.S. policymakers and allies.

Addressing the Challenge: Limitations of Legacy Aircraft

Tacticians will have their work cut out for them in facing scenarios like the ones described in the last section. Geography and growing numbers translate into the potential for highly disruptive tactics.

Unfortunately, the U.S. has yet to replace hundreds of legacy aircraft: F-15s, F-16s, F/A-18s and AV-8Bs. U.S. forces may still be superior in equipment and training. But the lopsided edge of the 1990s is gone.

In fact, the Pacific pivot caught the fighter modernization plan in disarray. It’s worth reviewing how it happened. The problem did not arise overnight, and many factors contributed. In 1997, the first Quadrennial Defense Review as mandated by Congress took stock of fighters and strike forces. The review formalized the reduction from eight fighter types across all services to three. At the same time, this first QDR laid out a future high-low mix: F-22s, F-35s and F/A-18EFs.

Its guidance was to prepare for small-scale contingencies and “large-scale, cross border aggression” which kept the force-sizing focus on ground attack roles.

The 1997 QDR also contained an important warning. It hedged the emphasis on two regional wars with the comment that “beyond the 2010-2015 period, there is the possibility that a regional great power or a global peer competitor may emerge.”²⁴

For a few years, the streamlining plan went smoothly. The Navy moved out quickly on its airwing reconfiguration, retiring the A-6, A-7, and eventually the S-3 and F-14s. The USAF eliminated remaining F-4s and F-111s including its small force of 35 EF-111s, and held to its decision to halt F-15 and F-16 purchases even though those aircraft had been highly successful in the 1991 Gulf war. It even retired the F-117 in 2008.

But in the 2000s, the strike fighter modernization plan unraveled. At first the adjustments were relatively minor. For example, the F-35 encountered an early round of design problems. The Pentagon restructured the program and later put the Marine Corps STOVL variant in the front of the line for testing and initial operating capability.

All along, concerns were growing about the impact of aging fleets. Aircrews from the USAF, USN and USMC quietly enforced no-fly zones for years over Iraq and the former Yugoslavia. Aging inventories created lower mission capable rates which emerged as early as the second Iraq war of 2003.

- The Navy faced a strike fighter shortfall due to aircraft aging and took the option of buying the F/A-18EF in greater quantity.
- The Air Force shed 559 fighters from 2000 to 2010 dropping from 2564 to 2015 in the total inventory including the Active, Guard and Reserve.
- For its part, the Marine Corps opted to stick with AV-8B Harriers and F/A-18CDs until the F-35 was ready.

Still, the problem remained largely in the background during the peak years of the wars in Iraq and Afghanistan. Current fighter inventories were more than adequate for those conflicts and developing new ISR and communications aircraft took precedence.

²⁴QDR 1997, Section IV.

Budget troubles hit next. The F-22 buy was originally cut back under the George W. Bush administration and was not fielded in the quantity prescribed for a high-low mix. In 2009, the F-22 buy was capped at 186 aircraft, far below original requirements. However, it remains an essential part of the mix. “The F-22 is the only fielded U.S. fighter capable of operating in A2/AD environments,” testified two USAF major generals in March 2012.

With the lower F-22 quantity, even more responsibility for future air dominance shifted to the F-35. But the Pentagon put off purchases of F-35 production aircraft for various reasons.

By then, the forecast of the first QDR was coming true with the emergence of China as a rising regional power. The ISR model and system developed in Iraq and Afghanistan can help in the Pacific, but assets and CONOPS will have to be adjusted to operate in contested airspace. With new threats looming, the services are left scrambling to make up shortages through a variety of methods: new purchases of older-design systems, service life extension, retirements of expensive platforms and an overall drop in inventory requirements.

Problems of Relying on Legacy Fighters

The Pacific pivot rests on a fighter force that has already taken on growing risk through diminished inventory and extension of older types. In 2008, the USAF fighter requirement stood at 2250 total aircraft to carry out the national military strategy with increased risk.²⁵ In March 2012, the Air Force lowered its fighter requirement to 1900 total aircraft to carry out the national military strategy with increased risk.²⁶ Those 1900 fighters were expected to yield 1100 primary aircraft available for operations under a standard formula accounting for training, back-up aircraft inventory and aircraft in periodic depot maintenance. The Air Force’s statement admitted that the 1900 objective inventory number assumed risk.

Part of the risk comes from retaining legacy fighters while PLAAF capabilities and tactics improve. The slow pace of F-35 production has forced the services to invest in upgrades and life extension for legacy fighters.

According to a November 2012 report from the GAO,

- The Air Force plans to extend the service life of selected F-16s

The Pacific pivot rests on a fighter force that has already taken on growing risk through diminished inventory and extension of older types.

²⁵ John Tirpak, “Fighting for Air Dominance,” *Air Force Magazine*, April 2008.

²⁶ See Joint Statement of Maj Gen John Posner and Maj Gen Michael Holmes, to House Armed Services Committee, March 20, 2012.

by 2,000 flying hours each as well as install capability upgrades such as an improved radar. The Air Force estimates that it will complete this work by 2022 at a cost of \$2.61 billion. About 28 percent of the projected costs are included in the Air Force's spending plans through 2017, with the remainder expected to be incurred in 2018-2022.

The Navy approached the problem differently. First, the Navy opted to continue purchases of F/A-18EFs and the derivative F/A-18G, an electronic warfare platform. However, the Navy has also proposed life extension of 150 older F/A-18Cs, an unusual move for the sea service given the effects of the corrosive maritime environment on aircraft. In the words of the GAO:

- The Navy plans to extend the service life of selected F/A-18s by 1,400 flying hours each and may install capability upgrades on some of the 150 aircraft—such as adding the ability to integrate with newer aircraft. The Navy projects that it will complete the life extension by 2018 at a cost of \$2.19 billion, with most of these costs included in its spending plans through 2017, but costs associated with any upgrades are not included in the Navy estimate or in its spending plans.

The price of these plans is close to \$5 billion dollars. The additional cost is the risk stemming from lesser capability of old aircraft. Even the North Korean scenario could present lock-out to upgraded, life-extended legacy aircraft as air defenses improve.

Under the Pacific strategy, what was deemed “moderate” risk in the late 2000s yawns into significant risk for 2018 and beyond. As adversary systems improve, the large number of legacy fighters in the inventory gradually diminishes overall U.S. capability. Upgraded legacy F-15s, F-16s and F/A-18s do not provide all the advantages that will help the U.S. and allies keep the edge.

Taking Advantage of Stealth

The key to reclaiming those advantages lies in fully exploiting the integrated stealth design of the F-35. It remains the only viable option for replacing old force structure in a way that keeps advantages for 2020 and beyond. This was the plan put in motion over a decade ago in anticipation of tight budgets and evolving threats, and most of all, of the need for the U.S. to retain control of the air in any theater.

Stealth tactics for the integrated air battle have come a long way since the F-117 excelled as light bomber attacking vital targets in and around Baghdad under the nose of Iraqi air defenses in 1991. The F-117 lacked air-to-air weapons, radar or fighter-like agility. In contrast, the F-22 and F-35 are slated to fulfill several roles in the battlespace and rely on all the aerodynamic attributes of modern fighters.

Low observability to radar enables the F-22 and F-35 to get closer to threat emitters and function as more effective electronic warfare platforms. This includes tasks such as providing electronic attack, destruction of enemy air defenses, non-traditional ISR, and airspace control paired with non-stealthy fighters.

One of the best examples is electronic warfare. Stealth design also provides an edge for the application of electronic warfare functions. The overall DoD electronic warfare strategy includes many platforms but specifically calls on the F-22 and F-35 to perform self-defense escort jamming in denied airspace. The stealth aircraft are the only ones capable of this “stand-in” jamming role.²⁷

ECM contributes to survivability for all types of aircraft but is most effective in combination with stealth design. For example, conventional aircraft return large signatures. However, ECM is limited by the power of the airborne jammer.

Therefore, a smaller aircraft RCS is easier to cloak because it requires less power from the jammer. An aircraft that reduces its front-aspect signature by a factor of 10 cuts the notional detection range by 44 percent. The power required in the ECM jammer decreases accordingly. For the same amount of power, ECM can jam more effectively.²⁸ Using a decoy as a jammer also eliminates the issue of interference from the jamming aircraft.

The DoD strategy for electronic warfare has already taken this into account. Escort jamming operations inside the detection range of enemy systems surface-to-air missile radars currently fall to the fighter force. According to DoD, there are two forms of escort jamming:

- **Modified Escort Jamming.** The Navy EA-18G and EA-6B are equipped for modified escort jamming in defended airspace but *outside* the intercept range of surface-to-air missiles.

ECM contributes to survivability for all types of aircraft but is most effective in combination with stealth design.

²⁷ Government Accountability Office, Airborne Electronic Attack: Achieving Mission Objectives Depends on Overcoming Acquisition Challenges, (Washington, DC: GAO-12-175 March 2012), p. 7.

²⁸ Rebecca Grant, The Radar Game, (Arlington, VA: Mitchell Institute, 2010, Second Edition), p. 44.

- **Penetrating Escort Jamming.** The F-22 and F-35 are built to perform penetrating escort jamming *inside* the intercept range of known surface-to-air missiles. The mission includes attack against emitting radar systems. Currently, aircraft like the F-16CM accompany strike packages as close as needed to target areas. Fighter and strike aircraft can jam or launch missiles like HARM to destroy active emitters.

Under this strategy, the F-22 will geolocate targets as part of a planned modification of its software. Working with its large AESA radar, the F-22 planned spiral capability modifications will enable it to detect and calculate coordinates for an enemy emitter system and attack on those coordinates.

The electronic warfare abilities of the F-35 also stem from the AESA radar and associated mission software that creates a sophisticated ability against nodes in adversary air defenses. For penetrating jamming, the F-35 is able to get in close and provide self-defense on a strike mission. When available in numbers, the F-35 will take on a major electronic warfare role. The dense air defenses of a nation like China place special demands on the F-35 as a penetrating escort jammer for all services and allies. In fact, the F-35 is on track to be the only jammer a) available in quantity and b) capable of handling the heaviest range of threat emitters.

The Way Ahead for Air Dominance

Maintaining air dominance is one of the most essential force modernization tasks to flow from the Pacific strategy. The top priority is to assure that the fighter force has both the advanced capability and the numbers to do its part in providing crisis response options and ensuring deterrence. Deterrence depends on not allowing the balance of forces to slip to the point where rising peer forces can use geographic advantages to create an overmatch. The margin U.S. forces now enjoy could soon be vulnerable to localized efforts by China. Over the next decade the balance could tip further in China's favor.

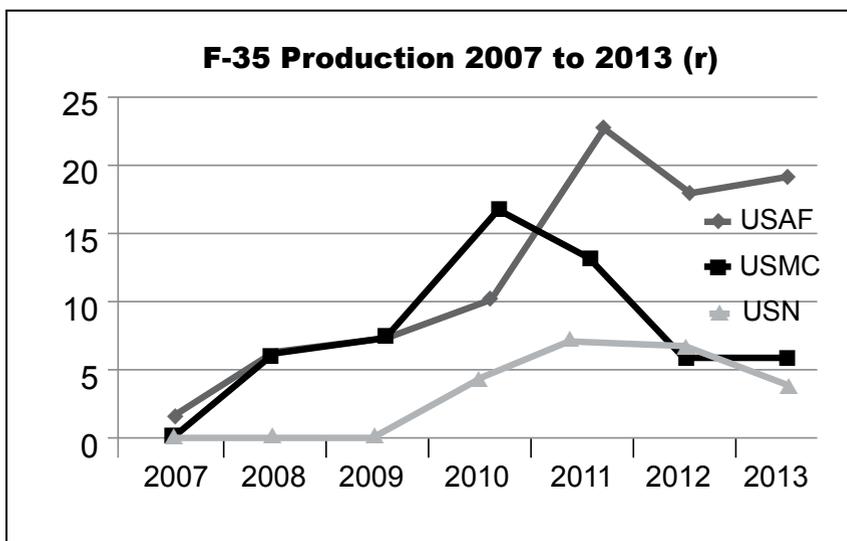
China has taken its own fighter modernization quite seriously. "For the remainder of this decade China's two main fighter makers will be developing and delivering their first aircraft carrier fighter, more 4+ gen models and their first 5th generation combat aircraft,"

noted Asian military expert Richard Fisher. “By 2020 it is possible to consider that the PLA will have close to 1,000 4th, 4+ and 5th generation combat aircraft,” Fisher concluded in a 2011 study.²⁹

Now it’s time for the U.S. to do the same. The Pacific pivot calls for both a near-term and a longer-term response in the management of the fighter force.

Getting Back to the Perry Plan?

The USAF, USMC and USN have long ago set their plans so that most of that future capability will be up to the F-35. As it turns out, the Perry plan conceived years ago set the right track to meet today’s needs. Acquisition of a smaller, stealth fighter fleet across the USAF, USN and USMC can still provide a strong foundation for meeting rising peer challenges in any theater. The technology mix designed into the F-35 represents the best combination of stealth, electronic warfare capacity and sensors.



In practical terms the problem going forward is the F-35 acquisition rate. The U.S. had purchased just 131 F-35s by the end of fiscal year 2012 (with 65 for the USAF, 48 for the USMC and 18 for the USN.) The chart shows the annual F-35 production to date including the Fiscal Year 2013 request.³⁰

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²⁹Richard Fisher, “China’s Maturing Fighter Force,” ISAC, October 15, 2011.

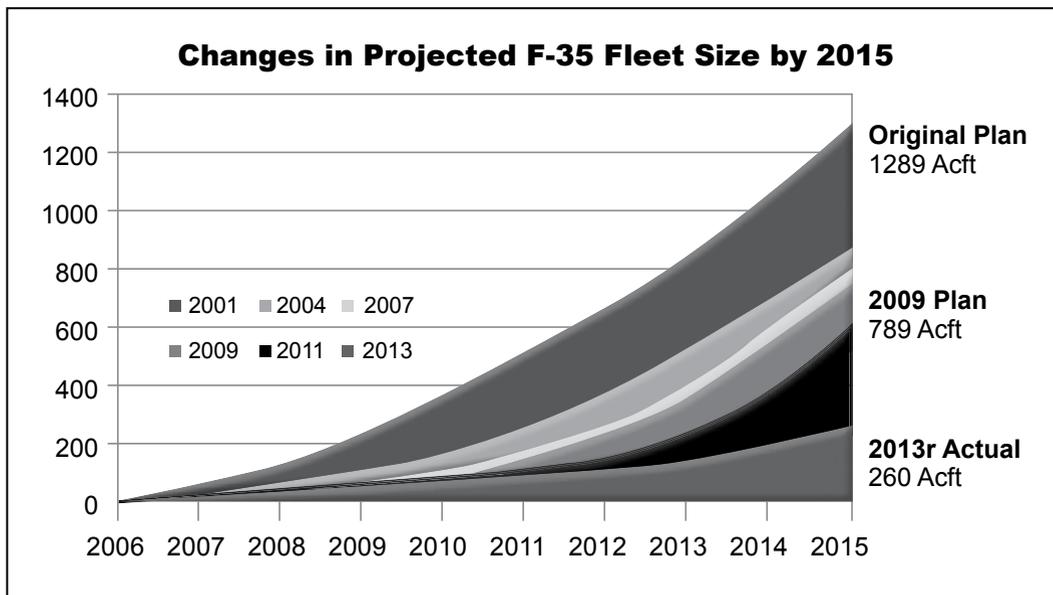
³⁰Jeremiah Gertler, *F-35 Joint Strike Fighter Program*, CRS Report for Congress RL30563, February 2012.

Various causes led to the delay. However, the deficit is building because current F-35 production rates are far below the original plan. The original plan put the F-35 at an annual production rate of 194 aircraft by the year 2012. The high rate was designed to save overall costs by putting most of the production into a ten-year block. Even as late as 2008, the plan was aiming for a rate of 48 aircraft per year by 2012.

The actual rate instead crested at 42 aircraft per year in 2011. Then it was scaled back to 31 aircraft for 2012 and the request for 2013 was lowered to 29 aircraft. Those production rate changes came even after F-35 testing had picked up pace and the F-35B STOVL was off the probationary period imposed in 2010. Over the FYDP, the Pentagon removed 179 aircraft, including 98 for the USAF.

Step One: Buying Out the F-35

The Asia-Pacific theater in 2020 demonstrates that the U.S. cannot afford to let its capability for control of the air decay. All three services need a highly capable, stealth fighter that takes the place of older and less capable aircraft. Streamlining the active inventory – and retiring old aircraft – is still the right path for overall economy and savings in this set of budget lines.



Many reductions have been made to the F-35 production plan as shown in the chart.

Even under an optimistic assumption, the F-35 buy in 2015 will be at barely 20% of the inventory originally planned. Rate reductions occurred early in the program from 2003 to 2006 due in part to technical difficulties. However, even steeper reductions came from 2009 onwards, as quantities plummeted. The 2013 wedge assumes that production increases from 29 in 2013 to 50 aircraft in 2014 and 2015.

Disturbing as the data is, the real question is not what happened in the past but what to do going forward. Here, the Asia-Pacific scenario forecast for 2020 is especially relevant.

By 2020, it would be prudent for the U.S. to field at least 1000 F-35s in the inventory – across all three services – in order to back-stop security goals in the Asia-Pacific and other regions. In the scenarios, inventory considerations ranged as high as 1170 for Korea and for full-scale conventional deterrence. Of course, the F-35 inventory must serve other goals such as guarding security options in the Middle East and forming the nucleus for a Coalition campaign like the one conducted in Libya in 2011. Consider those requirements together and the first 1000 F-35s would provide a significant capability increase.

Getting to a total of 1000 in the inventory necessitates a deliberate increase in the production rate for the F-35.

- One way to do that is to begin with increasing the rate for the USAF's CTOL F-35A first to 48 aircraft per year and then to 80 per year in 2015.
- The USMC's F-35B STOVL could ramp up to 36 aircraft per year in 2016.
- The Navy F-35C also moves to a better rate of 24 aircraft per year in 2016.

Under those assumptions, the total inventory would hit 1060 (with 612 USAF, 282 USMC and 166 USN) in 2020.

Granted, this rate is far less than envisioned when the program began. The USAF alone originally planned to reach a production rate of 110 aircraft per year, rising perhaps to 135 for a few peak years.

With sufficient quantity, the F-35 will also have a crucial role in

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maintaining the air superiority environment for other aircraft such as a new stealth bomber, unmanned long-range aircraft, and other future entrants to the combat air forces. These aircraft may fly high and sly but they must also take-off, transit altitudes, refuel and return to base. Segments of their mission routes could be very difficult indeed if the U.S. and allies cede local air superiority.

The F-35 is also the only option for filling in a new and critical function in air warfare. “The full impact of the F-35 aircraft comes with its fleet operational capabilities for the enablement of the air combat cloud,” said Air Force General Mike Hostage.³¹ The “cloud” stands as a metaphor for the distributed information environment established by air, space and cyber systems. Modern aircraft already rely on highly sophisticated information flows for offensive and defensive operations. Linking to other airborne fighters, bombers, unmanned vehicles and other offboard sources is essential to feed in the split-second information critical to precision attack. The stakes become even higher in a contested airspace environment. The F-35 could greatly expand this agile flow of information; without F-35s, legacy systems bump up against severe limits.

Step Two: Exploring Future Air Dominance

The second and equally crucial reaction to the Pacific pivot should be thoughtful consideration of how to keep the long-term edge. Accomplishing a speedy, economical buy-out of the F-35 is essential to clear the way for the next generation of air dominance.

Is it necessary to wait? What about rapid development of a new fighter program as an alternative to the F-35? Both the USAF and Navy are beginning to think about a future fighter that may make first flight in the late 2020s. However, this work is still in the earliest conceptual phases. Rushing to build a new type would be risky on several counts.

First, the timing of such a program is complicated. The most rapid development program probably could not achieve first flight until 2016 at the earliest even if it started immediately with unconstrained funding. Prototypes would have to use existing engines, avionics and designs to make the deadline. In other words, a rapid prototype aircraft would grab most of the F-35 systems. It would

During the next decade, a number of exciting technologies will start to take shape and could profoundly impact the future of air dominance.

³¹ Robbin Laird and David Deptula, “Why the Air Force Needs Lots of F-35s: Gen Hostage on the ‘Combat Cloud,’” AOL Defense, January 10, 2013.

probably look a lot like the CTOL version of the F-35 because that aircraft is actually state-of-the art.

If the rapid future fighter proceeded to down-select, recent experience suggests the schedule would take a minimum of five years to achieve full rate production. That schedule would put deliveries at 2021 and beyond. In effect, the USAF and USMC would receive no new fighters between now and 2021 and only a low-rate production trickle for a few years afterwards.

A much better strategy is to continue basic research but phase development of the next air dominance platform into a later period. Several next generation technologies still need time to mature. During the next decade, a number of exciting technologies will start to take shape and could profoundly impact the future of air dominance. Platforms, weapons and concepts may undergo a significant change. Among other things, this fighter of the future deserves new, fuel-efficient engines that provide good supersonic performance, extended range and enough power for the sensors and weapons of the future. Future weapons may well include lasers for aircraft self-defense and for missile interception. Lasers make specific demands for onboard power and configuration that should be addressed in a follow-on fighter. The role of cyberspace is as crucial as it is inscrutable.

U.S. fighter forces have to maintain the force structure for contingencies in the 2020 to 2030 timeframe. Future air dominance may take unusual forms – like an iPad or a space-transiting vehicle. Research on the next forms of air dominance should be vigorously pursued. However, few of these technologies are ready for demonstration much less procurement. That leaves the F-35 as the core capability to meet current needs, bridge the period of technology development, and get the Pacific pivot on track.

A Note on Understanding the “Red” Air Threat After 2020

Adversary fighters after 2020 have the technological potential to challenge U.S. control of the air domain. In past conflicts, the U.S. either faced no opposition or dealt with opponents who did not make the most of their small numbers of advanced fighters. Most of all, the U.S. was unchallenged in its mastery of the beyond visual range (BVR) environment. Airborne warning and control systems (USAF E-3 AWACS and Navy E-2D) and data links amongst fighter aircraft and other sensors created the ability to detect and track hostile aircraft. Longer-range missiles added the ability to shoot first.

The U.S. added much tactical and operational polish to these capabilities. Realistic training and exercises from Top Gun to Red Flag locked in air dominance for successive generations. The U.S. also took care to design dominant air-to-air and multi-role ISR and bombing capabilities into its fighter and strike force.

Looking ahead, potential adversaries still have some ways to go on training, tactics and integration. Advanced aircraft alone do not make an effective air force. But training and tactics can mature fast. U.S. fighter modernization has to stay ahead of threat capabilities to hold up its end of the deterrence bargain.

In the 1990s, non-U.S. designs began to catch up with new planes, better engines and recently, improved radar, other avionics and missiles. The Euro-fighter, Su-30, MiG-29 and China’s derivative J-10 and J-11 are aerodynamically on par with the bulk of the U.S. inventory of non-stealth aircraft such as the F-15C, F-15E, F-16, F/A-18C and even the newest of these, the F/A-18EF. The non-U.S. designs improved key features such as high-speed maneuverability, combat thrust to weight, wing loading and supersonic performance.

For a time, the Russian and Chinese fighters were held back by sub-par radars and less capable defensive and offensive electronic warfare systems. However, this too has begun to change with the addition of AESA radars and the spread of Digital RF Memory (DRFM) techniques for ingesting and replicating waveforms. The evolution in non-U.S. fighters has taken away much of the asymmetric edge which was such a fixture of conflicts from 1990 to 2011.

Airmen have been following these changes. “There are a few nations who have the ability to cause problems for us, and we’re getting to the point that our fourth-generation aircraft won’t be able to do the job we need them to do,” General Phil Breedlove said in March 2012. “We need a fifth-generation strike aircraft.”³²

Upgrades to 1970s designs have provided stop-gap capabilities, as previously discussed. However, F-16s, F-15s, and F/A-18s run up against limits when they must carry external weapons and fuel tanks as they would in combat in the Pacific (and other theaters.) Stores on the wings add drag. Drag lowers speed and maneuverability in combat. The F-35 (and F-22) have internal bays for weapons and missiles. They also carry their mission fuel internally. Internal carriage for fuel and weapons means the F-35 does not pay the same performance penalty that legacy fighters do. In practical terms, this makes the F-35 a much more capable aircraft for all types of missions simply due to the flexibility afforded by internal carriage.

Carrying weapons and fuel internally also facilitates radar cross section reduction. External stores generate a larger radar cross section than the aircraft itself. They make a fighter stick out even more to another fighter's targeting radar or to ground-based tracking systems. Lower the radar cross section of a fighter into the realm of stealth and the impact is very effective, especially against superior numbers of enemy fighters. As the quality and quantity of adversary fighters improve, a force composed mainly of F-35s is the U.S.'s only sure counter to the loss of air superiority. Advanced stealth remains a very significant advantage. It doesn't function by itself, but operates in conjunction with other sensors and communications datalinks that add up to major advantages. These are exactly the type of advantages essential to overcoming the threat China and other "red" adversaries can present.

The worst of the A2/AD environment is yet to come and it is on course to spread. The A2/AD problem "is a product of Chinese military modernization, but one that is also reflected in Iran and elsewhere," noted Tom Donnelly and Phillip Lohaus in a recent paper for the American Enterprise Institute.³⁴ The U.S. still has time to prepare with a fighter force that can keep open access, but not much time. Bureaucratic and budget failure on the F-35 program could undermine American options for decades to come.

"It could be that those who think there's never going to be an air-to-air engagement ever again in the history of the world could be wrong...."
Admiral James Winnefeld,
Vice Chairman,
Joint Chiefs of Staff, January 2012.³³

³² MSgt Cindy Dorfner, "VCSAF discusses benefits, uniforms, F-35 while at Luke," Air Force Print News, March 6, 2012.

³³ Jeff Schogol, "5 A-10 Squadrons To Be Cut," *Air Force Times*, January 30, 2012.

³⁴ Thomas Donnelly and Phillip Lohaus, *Mass and Supremacy: A Comprehensive Case for the F-35*, American Enterprise Institute, January 2013, p. 1.

Conclusion

American strategy has long depended on control of the air in the Pacific. Recall how the victorious World War II campaigns through the central and southwest Pacific waged bloody battles for air superiority. Every *Essex*-class carrier built, every island coral airstrip seized, was part of a strategy for ensuring American airpower was in the vanguard of the advance by naval and ground forces. The geography of the region dictates that projection of force is assured only when backed by control of the air.

China has drawn this conclusion, too. Airpower and seapower already appear to be part of the language of great power relations. Note how the first carrier landing “trap” of the J-15 fighter on the Liaoning occurred within days of President Obama’s November 2012 visit to South Asia.

The Obama administration’s Asia-Pacific strategy has already pointed this out. Deputy Secretary of Defense Dr. Ashton Carter underlined the commitment to preparing forces for the Asia-Pacific region even with budget pressures. “Despite the Budget Control Act, we are making no reductions to our tactical air posture in the Asia-Pacific,” said Carter in September 2012. “And we will permanently station the F-35 in the region. Said differently, our newest forces are going to the Asia-Pacific first,” he stated.³⁵

China’s airpower will soon raise the stakes for an “opponent” who must project power from island bases and aircraft carriers. As a result, the China of 2020 could have the option to leverage its smaller, but carefully-crafted military forces into obstacles that constrain the options of the U.S. and its allies should a crisis arise.

Deterring this outcome depends on the F-35. As analyst Jan van Tol wrote of Air Sea Battle, it “should be seen as an important contribution to prevention of Sino-U.S. conflict by—somewhat paradoxically—increasing confidence on the part of all regional actors that China would ultimately fail to realize its objectives through military aggression or coercion.”³⁶

Professor Joseph Nye of Harvard framed the choices. “American military forces do not aspire to “contain” China in Cold War fashion, but they can help to shape the environment in which future Chinese leaders make their choices.”³⁷ Control of the air is essential to that framework and the F-35 is the only way to maintain it.

³⁵ Remarks by “Deputy Secretary of Defense Carter at the Annual Air and Space Conference and Technology Exposition,” September 19, 2012.

³⁶ Jan van Tol et al., *Air-Sea Battle: A Point of Departure Operational Concept*, (Washington, DC: CSBA, 2010.)

³⁷ Joseph S. Nye, “Obama’s Pacific Pivot,” Project Syndicate, December 6, 2011.



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