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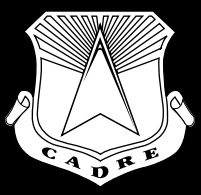

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Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations 5
Maj Gen David A. Deptula, USAF
Col Gary L. Crowder, USAF
Maj George L. Stamper Jr., USAF

Prelaunch Notes 13

Ricochets and Replies 13

Flight Lines

A Century of Air and Space Power 14

Features

Normandy: A Modern Air Campaign? 16
Dr. Thomas Alexander Hughes

America's First Air-Land Battle 31
Dr. Bert Frandsen

Airpower, Jointness, and Transformation 40
Dr. Stephen O. Fought
Col O. Scott Key, USAF
AWC Seminar Six

Losing Air Superiority: A Case Study from the Second World War 55
Dr. Richard R. Muller

Strategic Leadership: Defining the Challenge 67
Col W. Michael Guillot, USAF

The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later 77
Dr. David R. Mets

Net Assessment

Silent Wings at War: Combat Gliders in World War II 97
John L. Lowden
Reviewer: Lt Col Robert B. Kane, USAF

Tritium on Ice: The Dangerous New Alliance of Nuclear Weapons and Nuclear Power 98
Kenneth D. Bergeron
Reviewer: Capt Jay Hemphill, USAF

Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History 98
Colin S. Gray
Reviewer: Capt Gilles Van Nederveen, USAF, Retired

Gradual Failure: The Air War over North Vietnam, 1965–1966 99
Jacob Van Staaveren
Reviewer: Maj Paul G. Niesen, USAF

Flankers: The New Generation 100
Yefim Gordon, Dmitriy Komissarov, trans.
Reviewer: Maj Pete Osika, USAF, Retired

Out of the Italian Night: Wellington Bomber Operations, 1944–45 101
Maurice G. Lihou
Reviewer: Maj James Gates, USAF

Bombers over Berlin: The RAF Offensive, November 1943–March 1944 101
Alan W. Cooper
Reviewer: Maj James Gates, USAF

Disobedience and Conspiracy in the German Army, 1918–1945 101
Robert B. Kane
Reviewer: Dr. Douglas Peifer

Protecting the American Homeland: A Preliminary Analysis 103
Michael E. O'Hanlon et al.
Reviewer: Command Sgt Major James H. Clifford, USA

Six Days of War: June 1967 and the Making of the Modern Middle East 103
Michael B. Oren
Reviewer: Lt Comdr Youssef H. Aboul-Enein, MSC, USN

Wings, Women, and War: Soviet Airwomen in World War II Combat 104
Reina Pennington
Reviewer: Dr. Richard R. Muller

U.S. War Plans: 1938–1945 105
Steven T. Ross, ed.
Reviewer: Dr. Kevin C. Holzimmer

The Russian People and Foreign Policy: Russian Elite and Mass Perspectives, 1993–2000 106
William Zimmerman
Reviewer: Joe Derdzinski

Mach 3+: NASA/USAF YF-12 Flight Research, 1969–1979 106
Peter W. Merlin
Reviewer: Col John Chilstrom, USAF

Mick Mannock, Fighter Pilot: Myth, Life and Politics 107
Adrian Smith
Reviewer: Col Eric Ash, USAF

Misguided Weapons:Technological Failure and Surprise on the Battlefield 108
Azriel Lorber
Reviewer: Dr. David R. Mets

Kittyhawks over the Sands: The Canadians and RCAF Americans 109
Michel Lavigne and James F. Edwards
Reviewer: Lt Col Rob Tate, USAFR

Faster, Further, Higher: Leading-Edge Aviation Technology since 1945 110
Philip Jarrett, ed.
Reviewer: Kenneth P. Werrell

Index 115

Mission Debrief 126

Air and Space Power Journal Board of Reviewers

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Direct Attack

Enhancing Counterland Doctrine and Joint Air-Ground Operations

MAJ GEN DAVID A. DEPTULA, USAF
COL GARY L. CROWDER, USAF
MAJ GEORGE L. STAMPER JR., USAF

THE EVOLUTION OF war fightingÄ requires doctrine to be examinedÄ and adjusted to codify the *best practices* of new and evolving conceptsÄ that generate increased capabilities. For overÄ a decade, America's military has conducted aÄ series of operations that evidences a steadyÄ evolution of war-fighting capabilities and em≠Ä ployment methods. Those operations beganÄ with Desert Storm (ODS), January–FebruaryÄ 1991, and continued with Deliberate Force (ODF), August–September 1995; Allied Force (OAF), March–June 1999; Enduring Freedom (OEF), October–December 2001; and Iraqi Freedom (OIF), March–April 2003. In conjunction with land and sea power, America ex≠ ploited the asymmetric advantage of air and space power to achieve national-policy objec≠ tives in all of these operations—each with unique challenges that were, in turn, a cata-

lyst for further innovation and adaptation. In light of these experiences, it is appropriate that we examine current Air Force and joint doctrine to determine if both still reflect the best practices as experienced by the airmen who planned and fought them. One area that may benefit from such attention is the Air Force's *counterland* doctrine.[1]

Air Force Doctrine Document (AFDD) 2-1.3, *Counterland,* has been in revision for several years. That time reflects the very real challenges of trying to capture and codify emerging war-fighting practices within the context of known and enduring principles of counterland doctrine. One positive outcome from the length of its revision is that OEF and OIF have been fought and that those experiences offer fresh lessons and provide additional insight on how to proceed.

In that effort, Air Combat Command (ACC)—at the request of and in coordination with the Air Force Doctrine Center (AFDC)—hosted a counterland conference during the summer of 2003. The conference captured the experiences of airmen from OIF and OEF, with the objective of providing recommendations to the AFDD 2-1.3 Doctrine Working Committee. The ACC conferees, including representatives from all major commands and the Air Staff, agreed on three broad recommendations for the next revision of *Counterland*. First, the Air Force should consider the establishment of *direct attack* (DA) (previously also referred to as *battlefield air operations*) as a third counterland-apportionable mission category in addition to *air interdiction* (AI) and *close air support* (CAS), and should return the current *Counterland* definition of AI to the pre-1999 definition, making it consistent with joint doctrine.[2] Second, it should examine the feasibility of codifying the *killbox* as a primary airspace-control and fire-support coordination measure for counterland operations.[3] Finally, the service should replace *killer scout* with *strike coordination and reconnaissance* (SCAR) as a command and control (C2) qualification for DA and AI missions, in the same way a forward air controller (FAC) is a C2 qualification for CAS. The second and third recommendations are more broadly understood and simply reflect the manner in which we conducted counterland missions in OIF as well as how we plan to conduct operations in other theaters of operation. DA is, however, more complex, less well understood, and reflective of a broader and more enduring examination of how we organize, think about, and fight counterland. As a consequence, the following paragraphs will share the thoughts and accumulated understanding of those making these recommendations to the AFDC.

What is direct attack? Broadly stated, DA consists of air operations conducted to render the adversary's military capabilities ineffective outside an established land area of operations (AO) or when surface forces are operating in a supporting role to air forces. Although this is a working definition, it captures why a new mission category may be of value and how that could change the way we think about, organize, and conduct counterland operations.

We have known for some time that there are some inconsistencies in our counterland definitions. In the spring of 1999, NATO air forces taking part in OAF were employed against fielded military forces in Kosovo without an established NATO combined force land component commander (CFLCC).[4] Those sorties in and around Kosovo were classified in NATO doctrinal terms, using either *battlefield air interdiction* (BAI) or CAS mission categories.[5] The BAI designation was generally used when conducting operations against fixed military facilities (e.g., barracks, communications sites, etc.), and the CAS category was applied to missions flown against fielded military forces while under the direction of an airborne forward air controller (FAC[A]).

There were obvious flaws in those mission categorizations. First, BAI is not an apportionable mission category in Air Force or joint doctrine. Second, BAI presupposes engagements between friendly and enemy ground forces. Since there were no coalition ground forces engaged in OAF, then, by NATO's definition, BAI could not have occurred. Similarly, the missions categorized as

An A-10 touches down at Bagram Air Base, Afghanistan (above), following an Operation Enduring Freedom mission. Maintainers supporting Operation Iraqi Freedom repair another A-10 at Tallil Air Base, Iraq (left).

CAS in OAF were inconsistent with NATO, Air Force, and joint definitions. Doctrinally, CAS is used when counterland operations are conducted in close proximity to friendly forces and require detailed integration to prevent fratricide. In OAF, the counterland missions designated as CAS were flown in Kosovo against fielded military forces and under the control of a FAC(A) who was also responsible for the positive identification of targets and assessing and minimizing the potential for collateral damage. Although all of these FAC(A) functions were appropriate and required, without friendly ground forces the CAS mission designation was doctrinally in error.[6] If these missions, by definition, were neither CAS nor BAI, what were they?

The current Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms,* defines AI as "air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required."[7] While that definition has long been accepted, it nevertheless implies that the purpose of interdicting an adversary's ground forces is to prevent them from moving to a position from which they could engage friendly forces. Is this still an appropriate or workable definition when there are no friendly ground forces present?

In its 1999 revision of *Counterland,* the Air Force recognized and addressed these inconsistencies by revising its definition of AI: "*Air interdiction,* to include both lethal and nonlethal systems, is employed to destroy, disrupt, divert, or delay the enemy's surface military

potential before it can effectively engage friendly forces, or otherwise achieve its objectives."[8] This change acknowledges that airpower effects may be decisive, preclude a ground battle, and contribute directly to the joint force commander's (JFC) plan. On the surface, it appears to solve the problem by expanding the AI definition to include those operations when land forces are not present. However, practical problems remain: How do we organize and train for this mission? How do we exercise C2 during its execution? These questions can best be answered after developing an understanding of (1) the evolution of air and space capabilities over the past decade, (2) the joint interpretation on the conduct of counterland operations, and (3) the supported and supporting relationships.

Over the past decade, the Air Force has experienced nothing short of a revolution in military affairs in its capabilities to conduct counterland operations. The advent of persistent intelligence, surveillance, and reconnaissance (ISR) and the near ubiquity of precision-guided-munitions capabilities have given the joint force air component commander (JFACC) the ability to find, positively identify, and effectively engage the adversary's fielded combat capabilities with great precision—even in the most complex terrain and adverse weather conditions. In OEF these capabilities were significantly enhanced through the assistance of special operations and other ground forces in positively identifying targets, providing terminal guidance, and assessing the potential for collateral damage and the risks of civilian casualties. In fact, the operational effects of the DA missions that made up the preponderance of OEF air attacks included shocking, degrading, and destroying entrenched enemy forces. Those attacks were the key enabler for Afghanistan's Northern Alliance forces to capture Mazar-e-Sharif, Qala Qatar, Kabul, and Toloqan in the north and Kandahar in the south—ultimately leading to the removal of the Taliban regime. After the Northern Alliance had gained control of a large portion of Afghanistan, other DA operations independent of support to ground forces were conducted to support an *aerial* scheme of maneuver that targeted widely dispersed al Qaeda and Taliban ground forces that were fleeing the area.

MSgt Bart Decker, an Air Force combat controller, rides horseback with the Northern Alliance in Afghanistan during Operation Enduring Freedom. The air attacks that shocked, degraded, and destroyed entrenched enemy forces were significantly enhanced by special operations and other ground forces, like Sergeant Decker, in positively identifying targets, providing terminal guidance, and assessing the potential for collateral damage and the risks of civilian casualties.

The B-2 brings massive firepower to bear, in a short time, anywhere on the globe. The one shown above releases 32 Joint Direct Attack Munitions. The Spirit of Missouri, *a B-2 multirole bomber (right), returns to Whiteman Air Force Base, Missouri, after flying a 30-plus-hour mission in support of Operation Iraqi Freedom.*

During OIF high-quality intelligence and target cuing were used in conjunction with advanced targeting pods. This combination provided target information of sufficient quality to allow air attacks on fielded enemy capabilities in areas of the battlespace well in advance of friendly ground forces, and in areas of the battlespace where friendly ground forces were not present.[9] As demonstrated in recent operations in Afghanistan and Iraq, these capabilities are vital to the JFC. It is not clear that current doctrine is sufficient to describe to airmen and potential JFCs the best practices, methods, and organizational principles necessary to fully exploit these capabilities.

This point is reinforced as we examine the evolution of AI in joint doctrine. Joint Publication 3-0, *Doctrine for Joint Operations*, states that land- and naval-force commanders are the supported commanders within their respective AOs as designated by the JFC.[10] As the supported commanders and in their own AOs, they have the "authority to designate target priority, effects, and timing of fires."[11] The changes to joint doctrine have de facto reestablished *BAI*, a NATO term that was previously defined as that portion of the AI mission that may have a direct or near-term effect upon surface operations. AI within a CFLCC's AO is BAI in everything but name. A doctrinal reversion may be acceptable *if* it facilitates the planning and execution of joint air-ground operations in the broader pursuit of a JFC's objectives. However, it is not clear that this is the case.

The manner in which AOs are established, supporting and supported relationships defined, and component headquarters established, critically affects how we must organize to effectively execute counterland operations. When land components are established and an AO is defined, the land-component headquarters provides both a significant capability to define the adversary's ground *order of battle* and strategies to engage and neutralize those forces. Furthermore, the headquarters has with it an associated air support operations center (ASOC) for the C2 of air forces and the integration of air-ground operations.[12] However, when no land-component headquarters or surface AOs have been established (as was the case during all of OAF and during the critical first two months of OEF), or when the air component is designated the supported commander with ground-maneuver units in support (as in portions of OIF), neither Air Force nor joint doctrine adequately defines where and how these critical strategy, intelligence, and C2 capabilities reside and operate.

How we want to fight should determine how we organize to fight, and both subjects should be addressed in doctrine. Although current joint and Air Force doctrinal definitions and discussions of CAS and AI may still be adequate to deal with traditional joint air-ground operations, they do not do as well with the dynamic, nontraditional operations in noncontiguous battlespace that current and future air component commanders will face. That disconnect suggests the need for a reassessment that should begin by examining the ACC conferees' recommendation to add DA as a third apportionable mission category. DA could be used to address some of the current doctrinal limitations and concerns. The principal areas of concern are when air operations are conducted outside a surface-defined AO independent of a land scheme of maneuver, and occasions when either a CFLCC is not present or the requisite AO has not been designated. This is the distinct DA realm: an air operation conducted as a *scheme of maneuver* against enemy military forces, irrespective of the presence of friendly surface forces, and directly supporting the JFC's overall campaign plan.[13] Although DA operations may be conducted in coordination with friendly land forces, they do not directly support friendly land-force requirements—those are satisfied through AI and CAS. In DA, the JFACC is the supported commander and can use land forces for targeting support, manipulating enemy forces into a more vulnerable position, and occupying terrain after the battle is won.

The adoption of DA as the third apportionable mission category in counterland doctrine will formally define the ability of airpower to engage and destroy an adversary's fielded military capabilities under defined circumstances. That step will help establish and document DA methodologies, organizational principles, and "best practices" for use in those circumstances. AI and CAS will remain those counterland functions whose effects directly support the land scheme of maneuver. The codification of DA will facilitate the full and proper integration of air and space power into the JFC campaign plan, unleashing its tremendous capabilities and ensuring the most effective and efficient military victory.

The establishment of DA as a mission category is required to ensure that joint forces are properly organized, trained, and equipped for the effective conduct of this mission. In addition, such delineation would establish the requirement to develop and provide DA with appropriate C2 arrangements. Tactical air control parties (TACP) and ASOCs would be given appropriate systems, capabilities, and training to facilitate DA operations. Emphasis should be increased—accelerated, if possible—to provide for needed interoperability upgrades for terminal air controllers and aircraft. Current and planned investments in improved US targeting, attack, and ISR fusion capabilities will be leveraged by actualizing DA as a mission category and will provide an even more significant improvement in Air Force surface-attack capabilities, flexibility, and accuracy.

Two F-15E Strike Eagles soar through the Iraqi skies as they receive instructions from a forward air controller during a combat air support mission.

These recommendations seek to substantially increase the Air Force's capability to directly affect an adversary's fielded military capabilities across the battlespace; they also offer the potential to significantly increase the effectiveness of the nation's substantial and evolving ground combat power. In OIF, combinations of air and special operations forces in northern and western Iraq fixed Iraqi fielded forces in place, substantially reduced the risk of Iraq's broadening the conflict, eased the threat of theater ballistic missile attack on coalition forces, and freed coalition ground forces to focus nearly all of their effort on the JFC's main objective—the capture of Baghdad and the removal of the regime.

The principal challenges to implementing the DA recommendations are, ironically, the very reasons why the mission category is needed. The current intelligence and C2 architectures and processes necessary to plan and execute DA missions are principally provided by and located within the land-component headquarters. How, then, does the CFACC develop the capability to engage the adversary's fielded forces without ready access to the current intelligence and C2 architectures and processes—particularly when there is no CFLCC? Another important challenge is to define the doctrinal tenets for employing land-maneuver forces in a supporting role to air forces. The first step in solving these challenges is the formal codification of DA.

Intelligence can best be provided by the appropriate land-warfare experts to assist in the planning and execution of DA missions. This expertise is not normally resident in the CFACC staff or in the combined air operation center (CAOC) and should be provided by land component forces—whether or not land forces are deployed or the JFC has designated a CFLCC. Even when land forces are present, it is still critical to the efficient planning and execution of DA for this expertise to work formally for the CFACC, rather than as part of the CFLCC's *battlefield coordination detachment*.[14]

The functional C2 requirements for DA approximate those of an ASOC. That functionality could be accomplished by adapting the current CAOC combat-operations cell or

by working through a more traditional ASOC-type network. The best approach will vary with the particular circumstances. The former is more appropriate when there is minimal land-force presence; the latter when traditional Army, Marine, or special operations forces provide targeting support; and a combination of both when planning and executing major combat operations. Whatever the solution, these issues can best be addressed by doctrinally defining DA.

The proposal to adopt DA as a mission category is an acknowledgement of the significantly enhanced capabilities that air and space forces now possess and their ability to contribute in new and important ways to help achieve the JFC's theaterwide campaign objectives. The Air Force has developed the capability to directly engage and render ineffective an adversary's land forces—a capability that should be codified in doctrine. Doing so will enhance a JFC's ability to exploit this advantage during campaign planning and execution. The JFACC, with the intelligence and C2 support that would accrue as a result, will be able to leverage air and space capabilities across the entire counterland mission area. Finally, defining DA as a counterland mission will better educate airmen on how to exploit these proven air and space power capabilities in the planning and employment of joint air-ground operations—in both a supporting *and supported* role—and provide future JFCs with a significantly greater war-fighting capability. □

Notes

1. Counterland operations are defined as "operations conducted to attain and maintain a desired degree of superiority over surface operations by the destruction, disrupting, delaying, diverting, or other neutralization of enemy forces. The main objectives of counterland operations are to dominate the surface environment and prevent the opponent from doing the same." Air Force Doctrine Document (AFDD) 2-1.3, *Counterland*, 27 August 1999, on-line, Internet, 25 October 2003, available from https://www.doctrine.af.mil/Main.asp.

2. Robert S. Dudney, "Toward Battlefield Air Operations," *Air Force Magazine* 86, no. 10 (October 2003).

3. AFDD 2-1.3, 94. *Killbox* is a generic term for airspace-control measures used by the theater air-control system for controlling air-to-ground operations. An active killbox signifies (1) airspace potentially occupied by attack aircraft, (2) underlying surface zone that contains known or suspected enemy targets, and (3) underlying surface zone known to be clear of friendly forces. Killboxes are complementary to, and neither preclude nor conflict with, other airspace-control measures.

4. There were, in fact, three principal land commanders in the Balkans during OAF. Commander Stabilization Force (SFOR) and commander Kosovo Force (KFOR) were NATO commands in Bosnia and the Former Yugoslav Republic of Macedonia. The commander of Task Force Hawk was the commander of the US Army force in Albania, which never had its operational control transferred to NATO. However, throughout the conflict the supporting/supported relationships of these commands to the NATO combined force air component commander were never clearly articulated either in NATO or US channels.

5. *NATO Glossary of Abbreviations Used in NATO Documents and Publications*, January 2003, B-1, on-line, Internet, 26 October 2003, available from http://www.nato.int/docu/stanag/aap015/aap-15_2003_-b.pdf.

6. The Kosovo Liberation Army (KLA) was considered "friendly," and it operated in Kosovo during OAF. However, for a variety of policy reasons, NATO did not acknowledge those forces as coalition or friendly forces for the purposes of coordinating and conducting integrated air-ground operations.

7. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, on-line, Internet, 26 October 2003, available from http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf, 21.

8. AFDD 2-1.3, 23.

9. AFDD 1-2, *Air Force Glossary*, 9 July 1999, on-line, Internet, 26 October 2003, available from https://www.doctrine.af.mil/library/afdd1-2.asp. The glossary defines *Battlespace* as "the environment, factors, and conditions which must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces, facilities, weather, terrain, the electromagnetic spectrum, and information environment within the operational areas and areas of interest."

10. JP 3-0, *Doctrine for Joint Operations*, 10 September 2001, on-line, Internet, 26 October 2003, II-10, available from http://www.dtic.mil/doctrine/jel/new_pubs/jp3_0.pdf.

11. Ibid.

12. *Air support operations center* is "the principal air control agency of the theater air control system responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with other supporting arms and ground forces. It normally collocates with the Army tactical headquarters senior fire support coordination center within the ground combat element." JP 1-02, 28.

13. *Scheme of maneuver* is the "description of how arrayed forces will accomplish the commander's intent. It is the central expression of the commander's concept for operations and governs the design of supporting plans or annexes." Ibid., 467.

14. *Battlefield coordination detachment* (BCD) is "an Army liaison provided by the Army component or force commander to the air operations center (AOC) and/or to the component designated by the joint force commander to plan, coordinate, and deconflict air operations. The battlefield coordination detachment processes Army requests for air support, monitors and interprets the land battle situation for the AOC, and provides the necessary interface for exchange of current intelligence and operational data." Ibid., 64.

Prelaunch Notes

COL ANTHONY C. CAIN, EDITOR

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Ricochets and Replies

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GOOD ISSUE

I read the summer 2003 issue cover to cover. Dr. James H. Toner's "Military OR Ethics" is excellent; I will use it to mentor my company-grade officers. I also enjoyed Lt Col Richard R. Baskin and Dr. Dean L. Schneider's "Learning as a Weapon System."

Lt Col Barbara A. Krause, USAF
Denver, Colorado

A Century of Air and Space Power

AS THE WORLD celebrates its first century of powered flight, the significance of the Wright brothers' contribution is evident in nearly every facet of modern-day life. Aviation's influence on the world's economies, agriculture, research, construction, medicine, recreation, and a myriad of other activities is so pervasive that we do not even recognize it until we feel its absence. As if the images of destruction—bombed-out Second World War cities, the bombed-and-shelled Chechen city of Grozny, and more recently the ruins of the World Trade Center—were not striking enough, the near silence in America's skies during the week following the 9/11 attacks was a stark reminder of the psychological and economic effects that occur when aviation turns from benign to lethal purposes.

Within 11 years of the Wrights' first flight—a flight that lasted 12 seconds and covered 120 feet—the world entered the First World War and used aircraft for the first time in combat. Air transport began in little more than 25 years after that 12-second flight, and soon routine flights were scheduled between developed nations. Before 40 years of aviation history had passed, the world was engulfed in the Second World War. That war, characterized by dominant airpower, was brought to a sudden end by the first use of an aircraft-delivered nuclear weapon. During the following 10 years, the marriage of airpower with nuclear weaponry gave the Cold War its frightful character. States gradually acquired the ability to annihilate each other from the air in a matter of hours—long before Second World War–style land forces could arrive on the battlefield. As another decade passed, competition for air dominance shifted from a main emphasis on terrestrial-constrained systems to one that included space platforms designed to observe, collect, and exploit the regions beyond Earth's atmosphere. As Cold War competitions disintegrated, air and space power experienced another revolution predicated on global reach, rapid mobility, pervasive intelligence, and precision-strike capabilities. Today, no rational state would consider initiating a war against its neighbors without first calculating the relative advantages that it and its allies have over competitors in terms of air and space power.

This brief review of how quickly and significantly air and space power has transformed our world should encourage professionals to think about its probable influence during the next 100 years. Our profession's potential is boundless; the scope, pace, and character of air and space power that will emerge—as we tap into that potential—are largely a function of the goals we set and the energy with which we pursue them. The recent superlative performances in Operation Enduring Freedom and Operation Iraqi Freedom justifiably fill airmen with a sense of pride and accomplishment. Although some may view these recent successes as the logical accomplishment of visions cast by early airpower theorists, potential adversaries should recognize that we are not now content to rest on our laurels. The

future holds a special challenge, and in many ways we face that future with a blank slate, as did the Wright brothers and members of the US Army Air Service, the US Army Air Corps, and the early US Air Force as they defined air and space power's character at key developmental points in our history. Presently, several trends bear careful study if we are to step into the second century of powered flight with an understanding and a vision of how to proceed.

The emerging security context appears to be characterized by the pervasive threats of poverty, crime, terrorism, and rogue states, but for the time being, we face no peer competitor who could alter the status quo of the international system. This creates exciting opportunities for the US air and space power leaders, visionaries, and adventurers who will expand our capabilities. Innovations will likely occur in technological, organizational, and doctrinal areas—all of which have the potential to transform how we view our profession—so that we become more effective at employing air and space power in support of national security objectives.

Many potential adversaries recognize that they do not have the resources—economic, scientific, and social—to compete directly with US advantages in air and space power. Thus, their plans for a future conflict will increasingly employ asymmetric characteristics. Rather than building fighter forces to contend for air and space superiority, these competitors will concentrate on fielding active and passive systems designed to negate or bypass our overwhelming capabilities in these areas. Instead of fielding sophisticated space-based systems, these adversaries will concentrate on ground-based space-denial systems. US air and space power, in coordination with other joint capabilities, will have to adapt and evolve to counter each new asymmetric threat.

The memories of airmen suffering in North Vietnamese prisons permanently scarred our culture to the point that airmen will, correctly, go to great lengths to reduce the risks to aircrews as they execute their missions. The public's concern for casualties and prisoners of war has also caused national leaders to choose strategies that consider and, when possible, mitigate those risks. One logical outcome of these trends may lead us to question the utility of manned cockpits. Air and space combat capabilities could gradually evolve from manned platforms to remotely piloted vehicles as sophisticated defenses proliferate, as rules of engagement and risk tolerances become more stringent, and as national leaders demand greater involvement in mission-execution decisions. This could be a painful transition for a force with a legacy of warriors rising to do battle with the enemy; the alternative could be analogous to the First World War cavalry force that spent much of the war waiting for a breakout that never came. Trench warfare, machine guns, and artillery made horse cavalry ineffective for that war—new weapons in future wars may do the same for manned combat aircraft.

Finally, as we acquire long-term operational capabilities in space, the second century of air and space power may see a greater emphasis on exploiting space capabilities to influence terrestrial outcomes. Dramatic increases in lift capacity coupled with reduced payload weights could be catalysts for the transition to that more robust capability. Researchers are currently working on technologies that could produce these changes, which, if successful, could prove as significant as the Wright brothers' first flight.

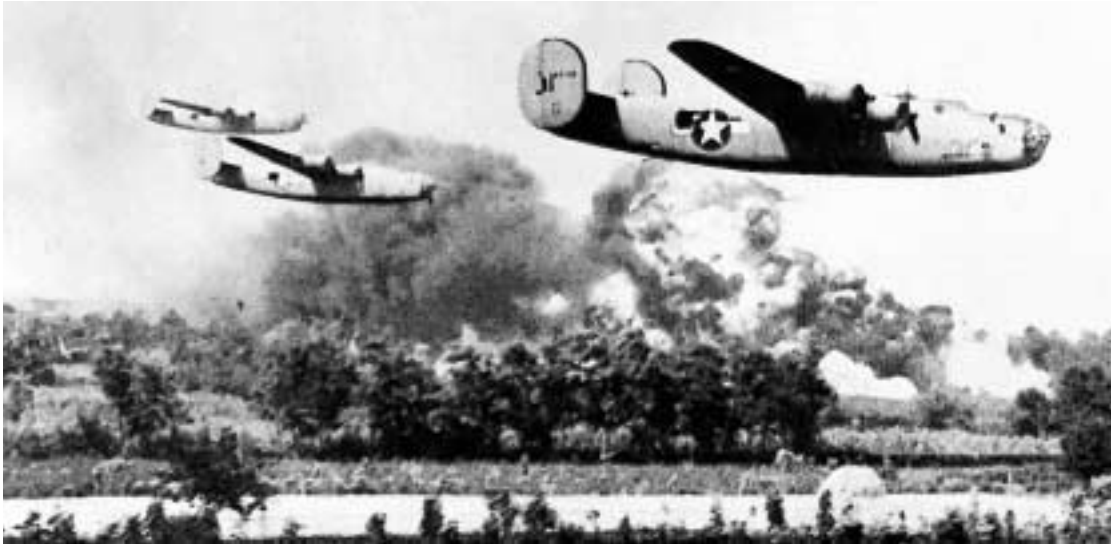
A century after Orville and Wilbur Wright revolutionized how we view our world, we stand poised to take the next step in the evolution of air and space power. The Wrights were not aviators by trade or training; they were, above all, visionaries who dreamed of transforming how we live. Today we face new challenges and new barriers that will constrain us only as long as we allow them to stand. The character of the next air and space power century depends solely on the creativity and energy of this and subsequent generations of air and space power professionals. □

Normandy

A Modern Air Campaign?

DR. THOMAS ALEXANDER HUGHES

Editorial Abstract: The air war for western France during World War II adds a relevant perspective to modern issues of command and control and the current stress on air and space operations centers. It also serves as a shining example of expeditionary air operations. Questions concerning the Normandy air war, as shaped by current beliefs, assumptions, and arguments about air warfare, mine a campaign rich in lessons that resonate for today's air warrior.



IN 2001 AND 2002, groups of Air Force officer and enlisted personnel assigned to United States Air Forces in Europe participated in staff rides in Normandy, France. These men and women traveled across terrain their air-arm ancestors flew above—and dominated—nearly 60 years ago as part of Operation Overlord, the climactic invasion of western France during World War II. These rides offered opportunities to learn something of the history and heritage of the Air Force, for seniors to mentor juniors, and for all to interact in informal settings. Along the way, stories of individual heroism, devotion to duty, and dogged determination rose from the old Allied airfields of England and Normandy. But these rides were more than elaborate retreats, important as those are to the body and soul of any organization. The rides also explored matters of the Normandy air campaign that resonate today. The air war for western

France, long ago though it was, adds perspective to modern issues of command and control, underscores current stress on air and space operations centers (AOC), implies the transcendent characteristics of the simultaneity of airpower and effects-based operations, and offers a shining example of expeditionary air operations.

Change occurs over time, of course. But the relevance of the past is not a function of its proximity to the present. There is nothing intrinsically germane—or even current—in the happenings of yesterday; nor is there anything inherently irrelevant—or passé—in the events of millennia past. Rather, relevance is a function of the questions brought to bear upon past experience. In the case of the Normandy air war, questions shaped by current beliefs, assumptions, and arguments of air warfare reveal a campaign rich with resonance and ripe for anyone willing to ply the past to teach about air war today.

The Normandy Air Campaign

The term itself sounds strange: *the Normandy air campaign*. Military aviation that was proximate, in either time or place, to the invasion of western France goes by many names and even more descriptions. Before the invasion, there was the Combined Bomber Offensive (CBO), the strategic attack on Germany by the US Strategic Air Forces and British Bomber Command. There was Pointblank, the refocusing of those attacks after early bombing efforts proved too costly. There was the Transportation Plan, which aimed to isolate the invasion area from German supply sources. There was the Oil Plan, a subset of strategic attacks deep into the Third Reich. As D-day neared, there was Fortitude, the Anglo-American deception plan that required thousands of sorties over Calais, France, to disguise the place of invasion. On D-day itself, there were thousands more sorties to carry airborne soldiers to their dramatic appointment with combat near Pegasus Bridge and Sainte-Mère-Église. Following the invasion, there was the massive effort to move two numbered air forces to the far shore; from their improvised expeditionary airfields came important developments in the air war, such as armed reconnaissance and armored-column cover. In July, Operations Goodwood, Charnwood, and Cobra featured thousands of Allied heavy and medium bombers, as well as fighter-bombers, working to blast holes through the tough German defensive crust. Before, during, and after D-day, there was Operation Crossbow, the Allied air strikes against Nazi V-rocket launch sites in Normandy and throughout Western Europe. And finally, there was a turkey shoot, when Allied planes rained destruction upon retreating Germans, creating not one or two but many highways of death.

The Normandy invasion demanded an immense effort from every combat arm. Military aviation associated with the assault included over 430,000 sorties; required the concentrated efforts of two American air forces and one English air force, as well as the occasional participation of British Bomber, Fighter, and Coastal Commands; and cost the Anglo-Americans at least 10,000 combat deaths and 30,000 total casualties among pilots and crews.[1] All this happened in some relation to the Normandy invasion. Yet, a perception persists that the air war in Western Europe is best viewed in relation to disparate parts. In memory and in literature, military aviation over western France occupies separate orbits: the strategic campaign against Germany; the tactical support for the ground assault; and the political campaign to strike Nazi V-1 and V-2 sites. Only occasionally are these orbits linked—and then usually in the language of distraction and disruption, with the objectives and requirements of one campaign diminishing the others.

This may make descriptions of the air war more facile, but it denies two related truths. One, in World War II as today, airpower's division into operational functions—its strategic, tactical, or support roles—is more apparent than real. Early airpower theorists postulated the unity of military aviation, and current concepts such as effects-based operations spring from renewed appreciation of airpower's in-

V-2 rockets were tested at the elliptical earthwork in Peenemünde, Germany.

divisibility. No inherently strategic, tactical, or support function exists in any given plane or weapon. To suggest otherwise is to deny airpower's versatility. Two, whatever the time period, military aviation organizes and operates best against the backdrop of a theater campaign. As a matter of doctrine, military officers believe that this broader campaign "integrates the actions of assigned, attached, and supporting" forces.[2] The theater commander, called the joint force commander (JFC) in the current lexicon, "determines appropriate military objectives and sets priorities for the entire joint force."[3] He or she does this through a joint campaign plan that "describes how a series of major operations are integrated in time, space, and purpose to achieve a strategic objective."[4] In other words, the joint commander and his or her campaign organize all military action in a given area of responsibility, regardless of the relative scope or the precise nature of contributions each service arm may make to the effort.

From a modern perspective, then, the invasion of Normandy serves to codify and categorize the various air operations in Western Europe in the spring and summer of 1944. From the dark days after Pearl Harbor, the Anglo-Americans intended an assault on Fortress Europe. In late 1943, Gen Dwight Eisenhower became that operation's supreme commander. After that, the invasion's eventuality was never in jeopardy, even as great debates attended its particulars. As a matter of policy and strategy, an amphibious landing and subsequent drive into Germany were the center of Allied activity in the West. So only one air war and one air campaign existed in Western Europe during the months on either side of D-day. As a thoughtful participant wrote on the eve of the invasion, the pressure of war had molded all the air forces—indeed, all theater forces—into a single weapon: "Gone now were differences between strategic and tactical, between ground and air, between Army and Navy, between Americans and their Allies. All were welded into one compact, devastating fist, set to deliver the Sunday punch."[5]

Seeing airpower indivisibly and in relation to a broader theater campaign reshapes Normandy air operations. The facts are as they have always been. Time and chronology shift not one whit. The number of sorties flown, bombs dropped, and personnel assigned to aerial forces stays constant. Descriptions of various personalities do not change. The Herculean effort required to move air operations to the far shore remains Herculean. Yet, the overall picture transforms from a series of fragmented and competing operations into a single operation that forms a single campaign: the Normandy air campaign.

Command and Control of Air Operations

The command and control of air operations has long been of signal importance to airmen. The issue helped sour relations among ground and air officers between the world wars, and the matter was hotly debated during the Korean and Vietnam conflicts. Today, particular questions—Who commands air operations? How is command translated into control?—continue to influence airmen and to shape interaction among the services. The Air Force holds dear "the fundamental concept of a single commander who is responsible for the planning and conduct of aerospace warfare in a theater of operations."[6] This airman, the joint force air and space component commander (JFACC) in the current lexicon, works for the JFC.[7] A clear relationship be-

tween the overall JFC and the subordinate JFACC helps ensure the effective use of airpower across the theater. As the air war over Kosovo in 1999 plainly revealed, differences over the best use of military aviation persist, but today's command arrangements make clear where final authority resides in any dispute between the JFC and JFACC.[8]

No such circumstance pertained in the Normandy campaign. Although General Eisenhower, as Overlord's supreme commander, acted as a JFC, no airman controlled all aerial assets assigned and attached to support the invasion.[9] Eisenhower's command, the Allied Expeditionary Force, had an air component, the Allied Expeditionary Air Force, commanded by Air Vice Marshal Trafford Leigh-Mallory and comprised of two air forces: the US Ninth Air Force and the British Second Tactical Air Force. This assigned force was responsible to Eisenhower for direct support of the US First Army and British Twenty-First Army during the invasion.

But other forces, notably the US Eighth Air Force and British Bomber Command, were not assigned but attached to the Allied Expeditionary Force. Since 1943 these organizations had carried out the CBO under the supervision of the Combined Chiefs of Staff.[10] The respective leaders of this effort, Lt Gen Carl Spaatz and Air Vice Marshal Arthur Harris, were deeply committed to strategic bombing and reluctant to cede command prerogative to Leigh-Mallory, whom they believed incompetent to direct bomber forces. The bomber generals readily recognized obligations to assist in the invasion but believed that their service to Overlord could best be accomplished via a cooperative arrangement with Eisenhower that left them freer to pursue the strategic bombing of Germany. Eisenhower insisted that any loose arrangement between the bomber forces and his organization ran contrary to the sanctity of unity of command, but two months of negotiation by plea and ploy won him no agreement with either Spaatz or Harris. By late March, his frustration in this regard was palpable: "Unless the matter is settled at once, I will request relief from this command."[11]

In a unified command, the bomber generals' intransigence flirted with insubordination. But Eisenhower did not exactly command Spaatz or Harris. Lacking today's clearer lines of theater authority, Eisenhower was left to broker a compromise. To do so, he turned to his respected deputy commander, Air Vice Marshal Arthur Tedder, who had risen to prominence "as a leader of large air forces consisting of all types of aircraft cooperating closely . . . with the overall theater command."[12] Tedder's background made him palatable to all air commanders, and Eisenhower engineered an informal scheme of control centered on his deputy. "I will exert direct *supervision* of all air forces—through you," he explained to Tedder, "authorizing you to use headquarters facilities now existing to make your control effective. L. M.'s [Leigh-Mallory's] position would not be changed so far as *assigned forces* are concerned but those *attached* for definite periods or definite jobs would not come under his *command*" (emphasis in original).[13]

On 7 April, barely two months before the invasion, agreement was at hand. The price was high: Eisenhower had placed the strategic air forces within his orbit yet beyond the reach of Leigh-Mallory. This meant he had no single air commander for Overlord. Henceforth, Eisenhower coordinated his air operations through three organizations of somewhat equal and clearly independent stature: US Strategic Air Forces in Europe; British Bomber Command; and the Allied Expeditionary Air Force. Only the strain of months of negotiation could frame such a solution as satisfactory.

Professional background and personal disposition had produced this mess among leaders of Overlord—men who were otherwise possessed of goodwill, sound experience, and technical competence. Lacking a doctrine that held sacred the preeminence of the JFC and his or her plan, these men were robbed of an effective forum to adjudicate their disagreements and help them see their respective efforts as parts to a greater whole. Spaatz, perhaps the war's finest American air leader, grasped the interrelation of various air tasks, but he never acknowledged what current Air

Force doctrine insists: that the "planning for joint air and space operations begins with understanding the joint force mission," which in turn forms "the basis for determining component objectives."[14] In 1944 that joint mission was undeniably the invasion of western France. Yet, well after Eisenhower's command arrangements became final, Spaatz continued to criticize the amphibious landing as "extremely uncertain" and "highly dubious." To his staff, he once reportedly exploded, "This ——— invasion can't succeed, and I don't want any part of the blame. After it fails, we can show them how we can win by bombing" (expletive deleted in original).[15]

Professional differences among high commanders are not always detrimental to operations and can be healthy if they are addressed and resolved in an appropriate forum. But the festering disputes of Overlord infected officers down the chain of command, especially those who operated in the seam between operational and tactical command. There, the absence of a single air commander meant dealing within and among air organizations that were essentially autonomous. The result was a needlessly complex air plan that integrated various invasion tasks in an uncertain and tentative manner. As late as 1 June, one week before the invasion, Leigh-Mallory felt compelled to remind Spaatz of the D-day targets "which it is desired you attack," recalling that "you or one of your representatives have agreed" to supply convoy cover and armed reconnaissance for the land forces. Furthermore, Leigh-Mallory understood that Spaatz had "agreed to" participate in deception operations and, "weather permitting," had acquiesced to striking railroad centers in the three days prior to D-day.[16] Such language resembled treaty negotiations among sovereign entities, not military commands under unified direction. There would be consequences for such shortcomings.

Air Operations Center

Forsaking a single air commander for Normandy air operations also meant doing without an integrated AOC. Today, these centers are the nerve loci through which an air commander conceives, plans, executes, assesses, and sustains air operations.[17] As a matter of Air Force instruction, an AOC has five major components: (1) a strategy division to relate aerial operations to the JFC's campaign plan; (2) a combat-plans division responsible for detailed execution plans in the form of an air tasking order; (3) a combat-operations division that oversees current-day operations; (4) an intelligence, surveillance, and reconnaissance division to oversee those air and space assets that provide informational awareness; and (5) an air-mobility division responsible for planning the logistical sufficiency of air operations.[18] As a matter of doctrine, an AOC focuses "an entire theater's [air and space] power in a central planning process" and integrates, relates, and coordinates the myriad pieces that constitute an air campaign.[19] As a matter of practice, AOCs and JFACCs are necessary adjuncts; one does not exist without the other. Together, they are the brains of an air campaign.

Eisenhower had no such advantage. Tedder's supervision of air assets during the invasion did not include a dedicated headquarters or staff. To exercise what control he did have, Tedder was forced to work through existing command channels scattered throughout many air organizations. Sixty years later, it remains difficult to decipher relationships among the various planning staffs, operational centers, and intelligence cells that coordinated air operations.

In theory and at the top, Tedder relied on an advisory committee comprised of senior representatives from the various air forces. This committee was supposed to be the "sole body responsible for advising the Deputy Supreme Commander in the direction of the bombing operations."[20] But fractured lines of communication and command doomed that goal. A Combined Operational Planning Committee, composed of yet other senior Anglo-American staffers, had for some time managed the CBO. This group now moved over to Leigh-Mallory's Allied Expeditionary Air Force to synchronize planning for the strategic

bomber forces and their tactical cousins, a task that overlapped the advisory committee's charge.[21] Confounding the planning matrix, the Allied Expeditionary Air Force also hosted the Joint Bombing Committee, which oversaw the planning and execution of air operations designed to isolate Normandy from Germany.[22] Even the members of these three committees did not know how their respective activity correlated, although in aggregate they looked the part of today's strategy division within an AOC.

Executing the Normandy air campaign involved less sorting than did strategic planning. In May, Tedder moved the Air Operations Planning Staff from Allied Supreme Headquarters to Leigh-Mallory's Allied Expeditionary Air Force: "There, with Tedder, the commanders of all strategic and tactical air forces met at Leigh-Mallory's daily conferences, and from there operational orders were coordinated."[23] Shortly thereafter, Leigh-Mallory established an advanced headquarters at Uxbridge, England, under Air Vice Marshal Arthur Coningham, commander of 2d Tactical Air Force. This headquarters housed a combined operations room and combined control center, which became fair approximations of today's combat-operations division.[24] By early June, these loci were coordinating thousands of sorties a day—peaking at over 12,000 flights on 6 June—with few aerial mishaps. Yet, if air-campaign planning proved too disparate, air operations were perhaps too centralized during the Normandy invasion: the Uxbridge communications net collapsed on D-day, overwhelmed by the sheer volume of message traffic. This left communications between air-support parties on the beaches and fighter-bombers on the flight line broken for crucial hours while invaders struggled ashore.[25]

Reconnaissance and intelligence functions were scattered throughout Eisenhower's command. Coningham had a combined reconnaissance center at his advanced headquarters, but its relation to his combined operations room or combined control center cannot be reliably surmised by proximity. Moreover, within the London Office of Strategic Services, well away from Tedder and Leigh-Mallory, sat a staff called the Enemy Objectives Unit. This group served as Spaatz's "unofficial target intelligence section" and greatly influenced Strategic Air Forces' assessment of air operations.[26] Oftentimes, its appreciation of current and planned operations was at odds with the assessments of more traditionally placed intelligence sections within the numbered air forces, creating much of the ongoing friction between the bomber generals and other Overlord commanders.

Many elements of an AOC existed within this admixture of committees, groups, and staffs. Yet, nowhere was the broad and varied activity of a modern air campaign centrally conceived, planned, executed, and assessed. In the understated words of one observer, planning and control arrangements were "too complicated."[27] The Royal Air Force's official historian believed that "so elaborate a system" demonstrated "the weakness of the committee technique"—a judgment that veterans of coalition air operations in the 1990s might find familiar.[28] Official American chroniclers added that the Overlord command setup functioned "not so much because of its structure as because of the good sense and proper spirit of top British and American commanders."[29] But this paints a too-happy face on the demands of coalition and joint warfare. Gen Frederick Morgan, the man who first outlined the invasion of western France, was more frank: "It will, I think, be considerable time before anyone will be able to set down in the form of an organizational diagram the channels through which General Eisenhower's orders reached his aircraft."[30] To date, no one has. In truth, the command relations for Normandy air operations were barely adequate.

Without the advantage of a single air commander and an integrated operations center, no one officer had the responsibility and capacity to plan and execute operations, a situation that sometimes led to ineffective performance. Despite dozens of planning conferences among numerous organizations, 1,200 Eighth Air Force bombers blasted Omaha Beach on D-day with a plan that failed to capitalize on the potential of airpower: the planes dropped

smaller bombs when they should have used larger ones, and most bombardiers delayed their bomb drops over the coast anywhere from five to 30 seconds, ensuring that most ordnance fell far inland of aiming points. Although these were decisions born of concern for the ground assault and the safety of soldiers, it was also clear to many that such a scheme would render the bombing nearly impotent. Yet, Overlord had no airman who could leverage command authority to change the plan—and assume attendant responsibility—or cancel the bombers' participation. As a result, in the words of the air arm's after-action report, "The immediate beach areas showed only limited evidence of bombing damage," and the strike failed to impair seriously the first line of German defenders—its professed objective.[31] Six weeks later, diffuse command and control arrangements contributed to short bombings on the first day of Operation Cobra, leading to the European war's largest single episode of fratricide within the American sector.[32]

Effects-Based Operations

Today, the Air Force believes that the transformation of military aviation invigorates and reshapes air operations. Modern technology, particularly stealth and precision-guided munitions, has greatly increased the capacity of aircraft. This revolution in military technology captivates Air Force leaders, but transformational airpower is also the function of organizational and intellectual shifts. Abolishing Strategic Air Command and Tactical Air Command in 1991 and creating a single Air Combat Command diminished the bureaucratic underpinnings of distinctly "strategic" or "tactical" aviation. This, in turn, fostered a more integrated conceptualization of air warfare. Now, concepts such as effects-based operations champion airpower's flexibility and versatility: aerial operations have no inherent strategic or tactical role and can strike "strategic, operational, or tactical objectives . . . [to] simultaneously achieve objectives at all three levels of war."[33] This idea, new to modern ears, actually harkens back to ideas about airpower's unitary nature that were commonplace in the 1920s.

At the heart of effects-based operations lies an exhortation to assess both the direct and indirect effect of air operations, to think beyond destruction—airpower's traditional product in war—and to consider second- and third-order consequences. Taken to its logical maturity, an effects-based methodology plans, executes, and evaluates air operations not only in the context of operational efficiencies, but also against the backdrop of strategic and political goals. As a result, the measure of merit for a given air operation or campaign might well value operational and strategic effect over quantitatively efficient destruction.

Although Overlord commanders lacked today's articulation of effects-based operations, they understood that air operations were not always best measured by resultant destruction. The classic example is Fortitude, the Anglo-American deception plan that pointed to Calais, some hundreds of miles from Normandy, as the invasion site. This scheme, which required many fake army encampments in Britain across the English Channel from Calais, also demanded real air sorties against real targets inland of Calais if the ploy were to work. In none of these missions were actual destruction and tactical success important. What mattered was maintaining the fiction that the Allies would assault Calais, thereby drawing the bulk of German resources away from the actual Overlord beaches. Precise data on the number of sorties flown, bombs dropped, and lives lost as part of Fortitude are difficult to compile, but this deception demanded sorties in the tens of thousands and lives in the hundreds, including one pilot, Lt Col Leon Vance, who earned a posthumous Medal of Honor by attacking a target that amphibious forces would never confront. These lives purchased Fortitude's feasibility at least as much as any sham military camp in England, and the ruse was a resounding success—the Germans kept many good fighting units near Calais until well after the Normandy invasion. At the time and afterward, history recorded few, if any, criticisms from air leaders about

this use of important resources and the sad expenditure of lives it encompassed.

Air strikes against German rocket sites in Western Europe did not enjoy the same measure of support among air leaders. Germany harbored great hope for its V-weapons program of flying bombs and rocket warheads, hoping they would hammer England with a million pounds of explosives a year (an amount equal to the Allies' bomber offensive output in its best year) and knock the Commonwealth from the war. In concert with passive and defensive measures, Allied airpower struck at the V-weapons, attacking production and assembly points in Germany as early as mid-1943 and targeting launch sites in Western Europe throughout the spring of 1944. These launch sites, which looked like ski jumps, were difficult to destroy with any efficiency. Nonetheless, only 22 of the 150 sites the Germans hoped to construct were ever completed. As a result, the Third Reich was forced to adopt an inferior launch system that "transformed what might have been an attack of the utmost severity into an assault which . . . was neither heavy enough nor strong enough to influence the course of operations."[34]

Such success came at high cost, however. Aerial strikes at the launch sites were code-named Crossbow, and by D-day these missions totaled 25,150 sorties and 36,200 tons of bombs—they also came at a price of 771 airmen's lives and 154 aircraft. American air leaders considered that level of expenditure excessive. In early May, the Air Staff in Washington concluded that these strikes "had grown out of proportion to the importance of the target or had become so uneconomical 'as to be wasteful, and should be curtailed.' "[35] In London, Spaatz complained of Crossbow commitments made "solely for British domestic considerations."[36] He protested that because no cohesive organization for air existed in the theater, his efforts were restricted and diverted by the "control [of] commanders that have only limited objectives."[37]

Lacking an articulate sense of effects-based operations, American criticisms of Crossbow sprang from a calculus of efficiency although the operation's effect may have provided a more appropriate measure of merit. A terrifically inefficient operation, Crossbow produced an enormous effect even if its results were porous: the Germans still launched 5,890 V-weapons at England through the summer of 1944, killing 5,835 and seriously wounding 16,792.[38] But this was not enough to cow the British. Crossbow's objective was not limited, as Spaatz declared, but central to the Anglo-American cause: securing the English homeland. Domestic political considerations in Britain did indeed compel Crossbow, but this did not mean it was a diversion. After all, political primacy informs all military operations, and political prerogative in war does not divert from war making; it constitutes it.

The hint of effects-based operations permeated the entire Normandy air campaign. In the six weeks before D-day, American air units struck at the important German coastal battery at Pointe du Hoe on 13 separate occasions. These missions did not destroy the guns, but the bombing compelled the Germans to move the barrels from a prepared battery, replete with support elements and a commanding field of fire, to a makeshift position a mile inland, rendering their muzzles less useful.[39] In effects-based operations, to suppress fire is the near equivalent of destruction.

Once Allied forces reached the far shore, the indirect effect of close air support and interdiction missions proved greater than the tactical objectives assigned to individual missions. In the weeks after invasion, air units struck relentlessly at prepared German positions in Normandy and enemy lines of communication throughout Western Europe. In June alone, the Allies bombed 90 marshalling yards and 75 rail and road bridges (including virtually every span crossing the Seine north of Normandy), destroyed rail engines in the hundreds and rolling stock in the thousands, and wreaked havoc on German defensive positions in the tens of thousands.[40] The direct effect was immediate. Field Marshal Gerd von Rundstedt, German theater commander in the West, described an "unbearable" Allied air superiority that had made "daylight movement

impossible."[41] Field Marshal Erwin Rommel, local commander along the Normandy coast, could only add, "There's simply no answer to it."[42] But the air strikes' indirect effect was greater still. According to Albert Speer, Germany's armaments minister, the accumulative impact of these attacks was catastrophic.[43] In the language of effects-based operations, the second- and third-order consequences of air operations supporting Overlord were greater than the sum of their individual tactical designs. Indeed, the attacks seeking to isolate western France from military reinforcements led to the "complete disorganization of the German economy."[44]

That air strikes in 1944 had within them elements of effects-based operations is hardly surprising. The success of aerial operations has always been a function of their effects—on friend and foe alike—and current talk about effects-based operations resembles in important ways iterations of targeting philosophy.[45] But the lack of a conscious, developed sense of effects-based operations among Overlord airmen probably robbed them of an analytic tool to help evaluate how they might best employ limited airpower assets. Tantalizing allusions to effects-based thinking emerged in the spring of 1944, as when Lt Gen James Doolittle, Eighth Air Force commander, warned Spaatz of a tendency "on the part of planners to measure destruction by tons of bombs dropped rather than bombs on target,"[46] and as when an air staffer pushed ground strategists to state "what effects are desired" for bombing missions on D-day as opposed to merely asking for a specific number of sorties, planes, and bombs.[47]

These isolated incidents, however, came to naught. Before, during, and after the battle, flier and soldier alike failed to recognize perhaps the greatest impact airpower had on the Normandy invasion. To this day, a casual walk along the Normandy coast reveals scores of entrenched batteries and nearly monumental emplacements of concrete. These sentinels serve as silent testimony that the mere prospect of Allied airpower had forced Rommel, the master of maneuver who had experienced the blast of Allied aviation in Africa, into a static defense of the West. Before the battle was even joined, airpower stole from him and his army their preferred way of war and diminished their capacity to react to the exigencies of combat, which was one of their few real hopes of success.

Parallel Operations

If effects-based operations offer a way to think about military aviation, parallel operations can leverage airpower's capacity to wage modern war. Parallel operations are "the simultaneous application of force (in time, space, and at each level of war) against key systems to effect paralysis on the subject organization's ability to function as it desires."[48] Air Force strategists believe that Operation Desert Storm heralded the impact of parallel operations: "In air campaigns before the Gulf War, force was applied sequentially to 'roll back' enemy defenses before attacking targets of the highest value." Today, with technological advances in stealth and precision-guided munitions, much more is possible: "The object of parallel war is to achieve effective control over the set of systems relied on by an adversary for power and influence—leadership, population, essential industries, transportation and distribution, and forces."[49] As much as any other factor, it is the coupling of modern technology, effects-based methodology, and parallel war that gives to airpower its transformational promise at the dawn of a new century.

Like other aspects of modern air campaigning, parallel operations have strong antecedents in the war for western France. This dimension of the air war has long been obscured by an inclination to view aerial operations in 1944 through the lens of air operations with specific political, strategic, or tactical purposes. Seen in isolation, the CBO, Transportation Plan, and Oil Plan, as well as Operations Fortitude and Crossbow, portray an air war that moved sequentially—one target (and one effect) to the other—denying the synergy that parallel operations can impart to air warfare. This is particularly true of the Transportation

Plan, which laid out tasks to accomplish before D-day as a series of sequential objectives.

But these operations did not occur in isolation from each other. To view air operations in the spring of 1944 as part of the broader Normandy air campaign is to see parallel operations far earlier than some airmen today might believe. Aerial campaigning for the invasion stretched from 1 January 1944, about the time Allied operations turned seriously to the question of D-day preparation, to 15 September 1944, when the breakout across France ended and the Western combatants settled into a stalemate that stretched to December's Battle of the Bulge. If one defines parallel war as daily air operations that targeted two or more of Germany's five vital systems—leadership, population, essential industries, transportation and distribution, and forces—then American airmen conducted parallel operations on 123 of those 259 days, and only poor weather scuttled parallel operations on an additional seven days. Factoring in the daily missions of British Bomber Command, which persistently pursued area bombing of German population centers, only widens and deepens the index of parallel operations during the Normandy campaign. Moreover, these operations increased in frequency and scope in the weeks surrounding D-day, when pressure to concentrate on single effects—rolling back German defenses near the beaches and providing close air support—was presumably greatest. On each of three of the last four days of May, for instance, Eighth Air Force's heavy bombers attacked aircraft works, synthetic oil plants, and military-vehicle plants deep in the Third Reich, while Ninth Air Force's aircraft struck marshalling yards, railroad bridges, and V-rocket sites nearer to Normandy. The same general pattern existed on the other side of D-day. In five of the seven days between 18 to 25 June, American aircraft attacked oil refineries, synthetic oil plants, and manufacturing plants in Germany while also striking V-rocket sites and a range of transportation, distribution, and fielded-forces targets in France (see table).

Parallel operations do not translate into a campaign of parallel warfare, of course. Campaigns require an awareness of, and focus upon, particular means to achieve particular objectives. In 1944 Overlord commanders did not consciously pursue parallel war. To the contrary, many leaders viewed the diversity of aerial operations surrounding the invasion as a problem that reflected a lack of focus and screwy command and control arrangements. Yet, parallel operations were not only the function of a quilt-work command setup and haphazard prosecution. They also reflected the desires of Leigh-Mallory, who "elected to spread his commitments so that five or six different bombing campaigns would be going on simultaneously," even though many air leaders, including his deputy, Maj Gen Hoyt Vandenberg of the US Air Force, "advised concentration on one program after another."[50] In the end, it was not an airman but a politician who best recognized the influence that parallel war had in Normandy. To Winston Churchill, airpower's great contributions to the invasion included its "diversity" and "magnitude, simultaneity, and violence."[51]

Expeditionary Air Forces

In recent years, the Air Force has developed air and space expeditionary forces to meet the challenges of a changing national security environment. Paradoxically, the end of the Cold War brought reductions in military resources and increases in air operations. Often, these operations took place in areas lacking permanent US forces. In response, the Air Force instituted a rotational construct to support a national strategy based on engagement and enlargement with the world. The nation's air arm now has 10 such air and space expeditionary forces, each rotating through an alert period, during which time designated squadrons, groups, and wings might be deployed to meet particular contingencies.[52] This expeditionary concept is a departure from the garrison force that characterized the Air Force for much of the Cold War. But it has deep roots in earlier experi-

Table

Parallel Operations during Normandy Air Campaign, 1944

	V-Sites/Strategic/Tactical	*V-Sites/Strategic*	*V-Sites/Tactical*	*Strategic/Tactical*	*Totals*
Jan.	None	4, ***24,*** 29, 31	23, 25	7	6 days
Feb.	10, 11, 29	3, 5, 8, 24	2, 6, 9	20	11 days
Mar.	20	11, 21	2, 5, 19, 26, 27	***3,*** 4, 6, 8, 15, 23	13 days
Apr.	10, 19, ***21***	None	5, 20, 21, 22, 23, 25, 28, 30	8, 11, 12, 13, 18, 24, 26, 29	18 days
May	1, 12, 19, 28, 29, 30	None	1, 2, 6, 9, 10, 13, 15, 20, 21, 22	4, 7, 27	19 days
June	18, 20, 21, 24, 25	None	2, 5, 16, 19, 22, 23, 27	***11, 13, 14,*** 15, 26, 29	15 days
July	2, 11	None	1, 5, 6, 8, 9, ***12,*** 17	7, 13, 16, 18, 19, 20, 21, 27, 28, 29, 31	19 days
Aug.	3, 5, 6, 30	None	1, 8, 9	4, 7, 14, 16, 24, 25, 26, ***27***	14 days
Sept.	None	None	None	3, 5, 8, 9, 10, 11, 12, 13	8 days
Totals	23 days	9 days	44 days	47 days	123 days

Source: Data derived from Kit C. Carter and Robert Mueller, *The Army Air Forces in World War II: Combat Chronology, 1941–1945* (Washington, D.C.: Government Printing Office, 1973).

Note: Dates in bold italics represent planned parallel operations cancelled due to bad weather or operational obstacles.

ences of the nation's air arm. An expedi≠tionary rationale lay behind the General Headquarters Air Force in the mid-1930s. And airmen who fought World War II from makeshift fields far from home, under every conceivable condition and circumstance, were part of the greatest expeditionary air force the world has yet known.[53]

The American air units involved in Over-lord constituted some of the war's best mobile air forces. Eighth and Ninth Air Forces, which had aggregated over 400,000 men by D-day, crossed an ocean to conduct operations from unfamiliar airfields over foreign ground, usu≠ally striking targets unknown to them prior to an intelligence brief a short time before take-off.[54] They often accomplished missions with great success, a fact that would have amazed those who recalled the inability of the Air Corps to deliver the nation's mail over friendly and familiar territory a short decade earlier.[55]

Ninth Air Force in particular was conceived and operated as an expeditionary force. It ex≠isted as a headquarters staff west of London in the fall of 1943 and grew into the war's largest numbered air force by the summer of 1944. Units poured into the Ninth prior to D-day, many coming directly from the United States. The task of settling into 54 unfamiliar instal≠lations scattered throughout southern England might have required most of their time, but scores of Ninth pilots were almost immedi≠ately pressed into the air war.[56] Its Fighter Command serves as an example: from a head-

quarters cadre of perhaps a dozen men in late October of 1943, waiting to incorporate green units from America, by March 1944 it had become a force of 35,000 men and 1,600 planes. In that time, the command added five fighter wings, 19 fighter groups, one tactical reconnaissance group, three night-fighter squadrons, two signal construction battalions, five signal air-warning battalions, one signal aviation company, four communications squadrons, five fighter-control squadrons, eight airdrome squadrons, two signal battalions, five detached signal companies, 11 military-police companies, and 18 station-complement squadrons—all housed among 17 airfields of uneven quality.[57] On average, fighter groups had three weeks to ready for combat operations, first escorting bombers and later conducting interdiction missions. The 354th Group, for instance, arrived in England in November, conducted its first fighter sweep shortly after its arrival, and had completed its 66th mission by March, making it one of the war's most seasoned groups two months *before* D-day.

After the invasion, Ninth Air Force's movement to the far shore underscored its expeditionary nature. This transfer and the subsequent construction of airfields in France were primarily the responsibility of IX Engineering Command and IX Air Force Service Command, by far the most populous segments of the Ninth. Their scheme of support for operations was ambitious: by D-day plus three, they planned to have ground elements in Normandy for the operations of two refueling and rearming strips, and by D-day plus eight, they planned to have support sufficient for the temporary operation of 15 squadrons. Permanent operations were to begin by D-day plus 14, and 40 days after the invasion, these men planned to maintain the permanent operation of 58 squadrons scattered throughout a newly liberated Normandy.[58]

They remained true to plan. One battalion of aviation engineers accompanied the first wave of troops landing on Utah Beach; by nightfall they had hewed a sod strip for emergency landings. Another aviation battalion crossed the sand on Omaha Beach early the next morning and immediately hacked out a 3,500-foot runway capable of C-47 cargo operations near Saint-Laurent. Four days into the invasion, the Ninth's support commands had 6,000 men and 1,000 support vehicles on the far shore. Ten days later, these units numbered 18,000 men and 4,200 vehicles in Normandy. Together, they built 19 airfields in the American sector by 5 August. By then, there were over 40,000 Ninth Air Force support personnel on the ground in France, providing the critical logistical sufficiency for an ever increasing number of fighter-bomber groups moving to the far shore. No one had to tell these maintainers the vital task they performed in the workings of an expeditionary air force, and no one had to tell those who ran the air war: nearly every major air leader who left memoirs of the European war paid homage to the decisive contributions made by the logisticians, engineers, communicators, security personnel, and other material supporters of the air war on the far shore.[59]

A Modern Air Campaign?

Judgments about the modernity of Normandy air operations must spring from recognition of airpower's indivisibility. Before it is tactical or strategic, airpower is, simply, airpower—a point made implicitly by Giulio Douhet and explicitly by Billy Mitchell as early as the 1920s.[60] Yet, this insight faded following World War II. The Air Force organized along functional lines—Strategic Air Command, Tactical Air Command, and Military Airlift Command—for the duration of the Cold War, and the resultant lens through which people viewed the past obscured important characteristics of the Normandy air war. Toward the end of the Cold War, a few Air Force officers, notably Col John Warden, championed renewed focus on theater air campaigning.[61] The Gulf War pushed this renaissance of thought up the chain of command. In 1991 Secretary of the Air Force Don Rice abolished Strategic and Tactical Air Commands in favor of Air Combat Com-

mand: "Desert Storm demonstrated that the line between strategic and tactical airpower has become blurred. The organization needs to catch up."[62] Structurally, the Air Force had come home to the unitary nature of airpower, a notion that had shaped earlier organizations such as the Air Corps's General Headquarters Air Force in 1935, and had influenced earlier operations such as those above Normandy. Not coincidentally, by the late 1990s, Air Force doctrine was stressing military aviation's unitary character. To some aging veterans of World War II, Rice's reorganization came as a welcome awakening. "I could have told them the same thing for 45 years," said the man responsible for the close air support of American soldiers on D-day, Lt Gen Pete Quesada.[63]

Able now to see Normandy against the canvas of the theater campaign and informed by a doctrine that once again highlights aviation's indivisibility, we find that Normandy air operations did indeed exhibit many characteristics of a modern air campaign, even though commanders lacked the concentrated and conscious approach required of air campaigning today. Military aviation's expeditionary nature in Normandy serves as a shining example for today's airmen who grapple with deployments under a myriad of circumstances. Yesterday's forces in World War II dealt with everything from logistical sufficiency to civil affairs to contracting to security to the use of foreign and scrip currency in Normandy.

The Normandy air campaign also entailed the antecedent use of airpower in effects-based operations and parallel warfare. Overlord commanders did not employ these concepts consciously, but the animating spirit of modern-employment ideas existed 60 years ago. In some circumstances, a developed sense of today's operational concepts would have helped make airpower more effective than it was in Normandy. This is not to say that airpower failed there; on the contrary, military aviation played a crucial and perhaps decisive role in the invasion of western France. But the United States Air Force has the happy challenge of learning from an experience marked by overwhelming success, a task that demands pointed analysis to decipher specific deficiencies within the context of broader victories. For Normandy, the greatest weaknesses of air operations were the failure to concentrate command authority in one person and the related absence of an integrated air operations center. The experience there, long ago, reaffirms and reconfirms the great emphasis the Air Force now places on a joint force air and space component commander with adequate authority, making his or her command effective through a robust air and space operations center. These crucial elements would have helped ensure airpower's optimal contribution to the joint campaign—as they do today. □

Notes

1. Office of Statistical Control, *Army Air Forces Statistical Digest, World War II* (Washington, D.C.: Office of Statistical Control, Headquarters Army Air Forces, December 1945), table 118, "Combat Sorties Flown by Theater, Dec 1941 to Aug 1945"; and table 36, "Battle Casualties in European Theater of Operation, by Type of Casualty and by Type of Personnel, Dec 1941 to Aug 1945."

2. Joint Publication (JP) 3-30, *Command and Control for Joint Air Operations,* 5 June 2003, vii.

3. Air Force Doctrine Document (AFDD) 2, *Organization and Employment of Aerospace Power,* 17 February 2000, 48.

4. "Air and Space Commander's Handbook for the JFACC," draft revision, 4 November 2002, 50.

5. Richard Ackerman, *The Employment of Strategic Bombers in a Tactical Role, 1941–1951,* United States Army Air Forces Historical Study 88 (Maxwell AFB, Ala., 1954), 1.

6. AFDD 2-1, *Air Warfare,* 22 January 2000, v.

7. Ibid., 25. See also "Air and Space Commander's Handbook for the JFACC," 17.

8. The JFC and JFACC intensely disagreed over the role of airpower during NATO's air war over Kosovo; see Lt Col Paul C. Strickland, "USAF Aerospace-Power Doctrine: Decisive or Coercive?" *Aerospace Power Journal* 14, no. 3 (fall 2000): 13–25. For doctrinal statements on the relationship between the JFC and the JFACC, see JP 3-30 and AFDD 2-1.

9. In today's parlance, Eisenhower was a combined force commander as well as a JFC because his organization included forces from more than one nation as well as those from more than one component of a single nation. His component commanders, in turn, were also combined commanders. Since these matters bear only marginally on my argument, for the sake of clarity and style I do not make these distinctions in the text of the article.

10. The Combined Chiefs of Staff consisted of the American and British service chiefs.

11. Gen Dwight D. Eisenhower, memorandum for record, subject: Agreement with Bomber Forces, 22 March 1944, in Dwight D. Eisenhower, *The Papers of Dwight David Eisenhower,* ed. Alfred D. Chandler Jr., vol. 3, *The War Years* (Baltimore: Johns Hopkins Press, 1970), 1782–85.

12. Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington, D.C.: Office of Air Force History, 1993), 331.

13. Gen Dwight D. Eisenhower, memorandum to Air Vice Marshal Arthur Tedder, subject: Control of Air Forces, 29 February 1944, in *The Papers of Dwight David Eisenhower,* vol. 3, 1755–56.

14. Air Force Instruction (AFI) 13-1AOC, *Operational Procedures—Aerospace Operations Center,* 1 July 2002, 4.1.1.

15. Davis, 328, 350.

16. Air Vice Marshal Trafford Leigh-Mallory to Lt Gen Carl Spaatz, letter, subject: D-Day Targets, 1 June 1944, US Air Force Historical Research Agency (AFHRA), Maxwell AFB, Ala., file no. 521.451, June 1944.

17. If coalition forces are part of an operation, a JFC might become a combined force commander; similarly, the JFACC might become the combined force air and space component commander, and the joint air and space operations center the combined air and space operations center. For simplicity's sake, I do not make these distinctions in the body of the text.

18. For information on the structure and purpose of an AOC, see AFI 13-1AOC. See also "Air and Space Commander's Handbook for the JFACC" and AFDD 2-1.

19. AFDD 2, p. 4.

20. Denis Richards, *Royal Air Force, 1939–1945,* vol. 3, *The Fight Is Won,* by Hilary St. George Saunders (London: Her Majesty's Stationery Office, 1953–1954), 88.

21. Norman Macmillan, *The Royal Air Force in the World War,* vol. 4 (London: Harrap, 1942–1950), 141. Some accounts call this group the Joint Planning Committee. See, for example, Davis, 336, 345.

22. Saunders, 86; and Davis, 348. The Joint Bombing Committee was sometimes also called the Allied Expeditionary Air Force Bombing Committee.

23. Macmillan, 142.

24. Ibid.

25. For details on the collapse of the communications net, see Thomas Alexander Hughes, *Over Lord: General Pete Quesada and the Triumph of Tactical Air Power in World War II* (New York: Free Press, 1995), introduction.

26. Davis, 347.

27. Macmillan, 141.

28. Saunders, 82.

29. Wesley Frank Craven and James Lea Cate, eds., *The Army Air Forces in World War II,* vol. 3, *Europe: Argument to V-E Day, January 1944 to May 1945* (1951; new imprint, Washington, D.C.: Office of Air Force History, 1983), 83.

30. Ibid.

31. After-Action Report, "Eighth Air Force: Tactical Operations in Support of Allied Landings in Normandy, 2 June–17 June 1944," 9, AFHRA, file no. 521.451, June 1944.

32. For details on the Cobra short bombings, see Hughes, 205–19.

33. AFDD 1, *Air Force Basic Doctrine,* September 1997, 24.

34. Saunders, 152.

35. Operational Plans Division, memorandum to commanding general, Army Air Forces, subject: Crossbow, 3 May 1944, cited in Craven and Cate, 103.

36. Davis, 391.

37. Lt Gen Carl Spaatz to Gen Henry H. Arnold, letter, subject: Crossbow Objectives, 22 April 1944, cited in Craven and Cate, 101.

38. Figures cited in Davis, 426.

39. Gordon A. Harrison, *Cross-Channel Attack* (Washington, D.C.: Center of Military History, US Army, 1951), 322.

40. For details regarding the air war over Normandy in June, see Hughes, 149–69.

41. Rundstedt cited in war diary of German Seventh Army, 18 June 1944, Spaatz Papers, Library of Congress, box 74.

42. Field Marshal Erwin Rommel to his wife, letter, subject: Allied Air Superiority, 10 June 1944, in Erwin Rommel, *The Rommel Papers,* ed. B. H. Liddell Hart, trans. Paul Findlay (New York: Harcourt Brace, 1953), 491.

43. Albert Speer interviewed by Lt Gen Carl Spaatz, 17 August 1945, Spaatz Papers, Library of Congress, box 140.

44. *Doctrine Watch #14: Effects,* on-line, Internet, 7 October 2003, available from http://www.doctrine.af.mil/Main.asp.

45. A good example is Cold War–era "objective targeting."

46. Gen James H. Doolittle to Lt Gen Carl Spaatz, letter, subject: Effects of Bombing, 14 February 1944, AFHRA, file no. 520.451, June 1944.

47. "Minutes of Meeting Held at Norfolk House, 24 April, 1944, to Consider Targets in Area of Second Army," AFHRA, file no. 520.451, June 1944.

48. David A. Deptula, *Firing for Effect: Change in the Nature of Warfare* (Arlington, Va.: Aerospace Education Foundation, 24 August 1995), 6. Furthermore, AFDD 2-1, *Air Warfare,* 22 January 2000, defines parallel attack as "simultaneous attack of varied target sets to shock, disrupt, or overwhelm an enemy, often resulting in decisive effects" (108).

49. Deptula, 6.

50. Craven and Cate, 149.

51. Cited in Saunders, 79.

52. *Background Paper on Air and Space Expeditionary Forces,* CCAEF, 4 September 2002, in author's possession.

53. The best explication of today's concept of the expeditionary air and space force is Richard G. Davis, *Anatomy of a Reform: The Expeditionary Aerospace Force* (Washington, D.C.: Air Force History and Museums Program, 2003), on-line, Internet, 18 September 2003, available from http://www.airforcehistory.hq.af.mil/Publications/fulltext/AnatomyOfAReform.pdf.

54. Office of Statistical Control, *Army Air Forces Statistical Digest, World War II,* table 20, "Military Personnel Overseas, by Theater and by Type of Personnel, Jan 1943 to Aug 1945."

55. In the spring of 1933, the Army Air Corps had great difficulty carrying the country's mail for a short duration while the federal government renegotiated contracts with civil air carriers.

56. Craven and Cate, 120.

57. Hughes, 114.

58. Craven and Cate, 132.

59. See, for example, Henry H. Arnold, *Global Mission* (New York: Harper, 1949); Gen James H. "Jimmy" Doolittle with Carroll V. Glines, *I Could Never Be So Lucky Again: An Autobiography* (New York: Bantam Books, 1991); and Arthur William Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force, Lord Tedder* (London: Cassell, 1966).

60. See Giulio Douhet, *The Command of the Air,* trans. Dino Ferrari (1942; new imprint, Washington, D.C.: Office of Air Force History, 1983); and William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: Dover, 1988).

61. See John A. Warden III, *The Air Campaign: Planning for Combat* (San Jose, Calif.: toExcel, 1998).

62. Rice cited in *Time,* 30 September 1991, 35.

63. Lt Gen Elwood R. "Pete" Quesada interviewed by author, August 1992, in author's possession.

The Wright Brothers

ASPJ STAFF

Orville and Wilbur Wright, sons of Milton Wright, a bishop in the United Brethren Church, changed the way we think about and interact with our world. Before their dramatic flight at Kitty Hawk, North Carolina, on 17 December 1903, conventional wisdom held that the range, speed, and scope of transportation and communication would never surpass the speed of horses, locomotives, or steamships. Orville captured the wonder and the excitement of their efforts when he remarked, "We had taken up aeronautics merely as a sport. We reluctantly entered upon the scientific side of it. But we soon found the work so fascinating that we were drawn into it deeper and deeper."

The two bicycle-shop owners and inventors from Dayton, Ohio, ushered in the modern era through their methodical approach to solving two basic problems: power and control. The Wrights made their most significant contribution in control, the more important of the two areas. Early experimenters—Otto Lilienthal, Samuel Langley, Octave Chanute, and others—had established a solid base for understanding wing design and air-pressure principles essential to remaining aloft. The Wright brothers acquired the results of earlier experiments from the Smithsonian Institution and sorted out the most important data in order to focus their research efforts. They also obtained weather data from the US Weather Bureau to determine the best site for their experiments, eventually selecting Kitty Hawk because it had the most consistent winds.

Beginning in 1900, they traveled there to conduct increasingly sophisticated experiments with kites and gliders that culminated in their successful flight in 1903. The Wrights' use of the same basic model from kite to the 1903 Flyer reflected just one aspect of their genius that set them apart from other experimenters. They correctly reasoned that they could limit the number of variables by sticking to a standard design. After the glider experiments of 1900, Wilbur wrote, "It is my belief that flight is possible. I am certain I can reach a point much in advance of any previous workers in this field even if complete success is not attained just at present."

The brothers fabricated their airframe and engine as well as the instruments they used to measure the craft's performance; they even made their own wind tunnel to test their wing and control techniques. By 1904 they had improved their 1903 design to the point that they were able to remain aloft for longer periods of time while controlling their craft well enough to complete a circle—landing near the spot where they had taken off. One witness described this performance as "the grandest sight of my life."

Wilbur died of typhoid fever in 1912 after gaining worldwide acclaim by flying and promoting flight research. Orville spent much of his time after Wilbur's death trying to protect the patent rights to their early aviation technology. He contributed little to the advancement of aviation designs after the 1920s and died after suffering a heart attack in 1948. But both brothers had done enough by solving the problem of leaving Earth under autonomous power and returning under controlled conditions.

To Learn More . . .

Burton, Walt, and Owen Findsen. *The Wright Brothers Legacy: Orville and Wilbur Wright and their Aeroplanes.* New York: Harry N. Abrams, Inc., 2003.

Crouch, Tom D. *The Bishop's Boys: A Life of Wilbur and Orville Wright.* New York: W. W. Norton and Company, 2003.

———. *A Dream of Wings: Americans and the Airplane, 1875–1905.* Washington, D.C.: Smithsonian Institution Press, 1989.

America's First Air-Land Battle

DR. BERT FRANDSEN*

Editorial Abstract: America's inaugural multisquadron fighter unit—the 1st Pursuit Group of the American Expeditionary Forces (AEF)—was created in May 1918. Only two months later, it fought in America's first-ever air-land battle for the French village of Vaux. In the greater scheme of World War I, the AEF counterattack at Vaux stands as a minor action, but it is an important milestone in the history of American airpower. American forces advanced against the final German offensive of the war, proving they could conduct modern combined-arms warfare.

ON 28 JUNE 1918, 52 Nieuport 28 pursuit planes landed near the village of Touquin, France. The aerodrome, only recently constructed by the French army, consisted of freshly cut wheat fields lined with canvas hangars. Located just 40 kilometers from Paris, it was part of an emergency defensive system being organized to contain a dangerous German breakthrough. The Nieuport 28s belonged to the 1st Pursuit Group of the American Expeditionary Forces (AEF), and in a few days it would fight in America's first air-land battle.

Organized less than two months earlier, on 5 May 1918, the 1st Pursuit Group was America's inaugural multisquadron fighter unit. The group quickly established air superiority against the undermanned and less well-equipped German fighter units that opposed it in the quiet Toul sector, its previous area of operations where the AEF was organizing a field army. The new base at Touquin, however, placed the group opposite the most deadly battle space on the western front. Here, the Germans had concentrated their best forces in a mighty offensive to win the Great War before American intervention tipped the scales in favor of the Western Allies.[1]

The latest phase of the German attack had achieved startling success against the French Sixth Army, creating a deep wedge in the French line with its nose at Château-Thierry.

*This article is adapted from the author's book *Hat in the Ring: The Birth of American Air Power in the Great War* (Washington, D.C.: Smithsonian Institution Press, 2003).

The arrival of German troops only 40 miles from Paris caused general panic and an urgent request from French general Henri Pétain for American reinforcements. In a race against time, these US forces had to be committed piecemeal to stem the German tide. Machine-gun units of the US 3d Division arrived first and helped the French defend the bridges across the Marne at Château-Thierry. A few miles farther east, the Marine brigade of the US 2d Division moved forward to replace French troops on the front line, resulting in the famous battle at Belleau Wood. Because the Germans fully exploited their command of the air, the Marines suffered 50 percent losses.[2]

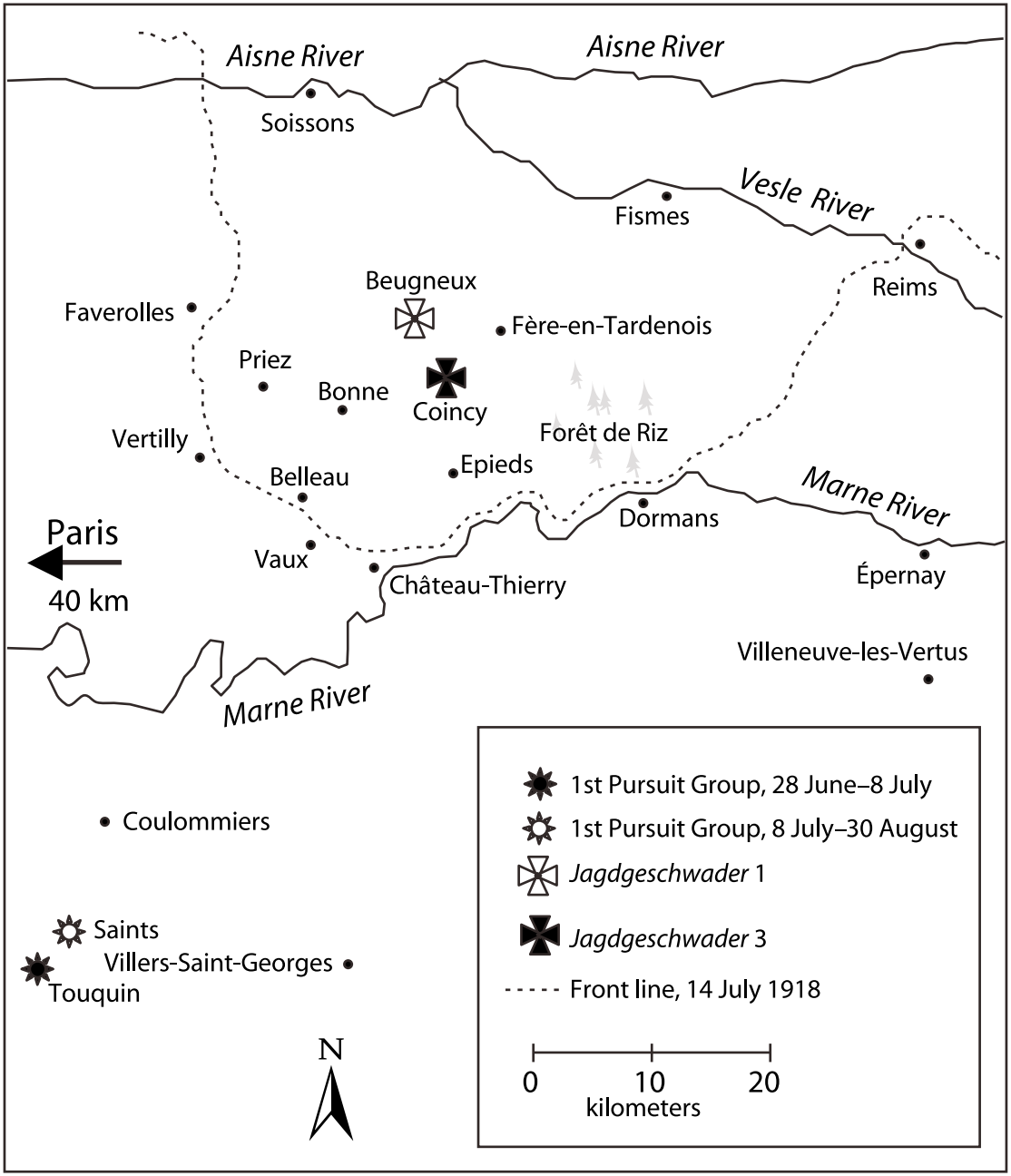
A report by an observer from the headquarters of Gen John J. Pershing, the AEF commander, on the first day of the Belleau Wood battle stated that "the Boche [pejorative French term for Germans] have control of the air around the 2nd Div. Sector."[3] Over the next weeks, the situation in the air continued to deteriorate. An intelligence report of 15 June stated that the Germans maintained continuous aerial reconnaissance over the division's forward area. Observers counted 57 airplanes flying over the sector, including several large patrols, and 15 enemy observation balloons in the air at one time observing the American sector. The excellence of the enemy's observation capability translated into intensely accurate artillery fire against the leathernecks. The report also warned of the difficulty of predicting what the enemy would do next because German air superiority kept friendly aircraft from observing movements behind enemy lines. Reports of as many as 80 German flights in a single day over the division's sector were not unusual.[4] Obviously, the Allies needed friendly pursuit units.

By mid-June, in response to this intolerable situation, Col Walter S. Grant, a senior AEF observer with the 2d Division, sent a strongly worded recommendation to AEF headquarters in Chaumont: "I recommend that an observation and a pursuit squadron of aeroplanes be sent here to work with this division at [the] first opportunity. The Germans have control of the air and embarrass our movements and dispositions."[5]

Col Billy Mitchell visited Headquarters Sixth Army in June to coordinate aerial reinforcements, reporting that he had "never seen a more stunned group of people. . . . They had lost miles of territory, thousands of men and hundreds of airplanes."[6] The 1st Pursuit Group replaced Sixth Army's *groupe de combat* because "hostile aviation had shot the Allied defense right out of the air."[7] Mitchell calculated that the Americans would be "outnumbered in the air almost five to one."[8] The enemy arrayed against them included two elite units of the German air force—*Jagdgeschwader* (JG) (Fighter Wing) 1 and 3—which occupied bases directly opposite on the other side of the lines. The four squadrons of JG 3 were based at Coincy, about 15 kilometers north of Château-Thierry, while JG 1 occupied fields at Beugneux, another five kilometers further north (see map).[9]

As Germany's first fighter wing, JG 1—organized by Manfred von Richthofen in May 1917—was the enemy's counterpart to the 1st Pursuit Group but clearly different in origin. Richthofen's Flying Circus was an elite organization commanded by Germany's top aces and staffed with specially selected pilots from a large pool of men with wartime experience. As historian Peter Kilduff has observed, "Numerous combat successes within a short time were key to remaining in JG 1." Richthofen amassed 80 victories before he was brought down in April 1918, but his successor, Capt Wilhelm Reinhard, continued the policy of transferring out "nonproducers." Shortly before the 1st Pursuit Group arrived in the Château-Thierry sector, Reinhard sent a report to his superiors indicating that the Germans had established air superiority: "Since the beginning of the planned assault the Frenchman has been very cautious, completely on the defensive, and only seldom crosses the lines. The individual French airman is very skilled technically, but avoids serious fighting."[10]

Besides experience, the Germans possessed some important technological advantages. On the same day the 1st Pursuit Group arrived



Château-Thierry Sector. The 1st Pursuit Group served as the French Sixth Army's groupe de combat *during July and August 1918. It fought the battle of Vaux from its base at Touquin. (Created by author based on data from "Récapitulation schématique des opérations du 18 juillet au 25 septembre 1918," map 32, in* État Major de l'Armée, Service Historique, Les Armées françaises dans la Grande Guerre, *vol. 1,* Cartes *[Paris: Imprimerie nationale, 1938]; and "Initial Plan of Attack in the Aisne-Marne," map 71, in* The United States Army in the World War, 1917–1919, *vol. 5,* Military Operations of the American Expeditionary Forces *[Washington, D.C.: Center of Military History, US Army, 1989], 231.)*

at Touquin, Ernst Udet, commander of one of the squadrons of JG 1 and Germany's leading ace at this time, saved himself by parachuting out after his airplane had been hit. Although balloon observers on both sides had parachutes, the Allies never adopted them for their pilots. The Germans had recently begun equipping their pilots with parachutes, allowing them to bail out and, if they landed in friendly territory, return to fight another day. Udet came back with another technological advantage—a new BMW 185-horsepower Fokker D 7, which many historians argue was the best fighter of the war.[11]

American aerial units did not arrive in time to assist at Belleau Wood, but as the 1st Pursuit Group landed at Touquin, the 2d Division was making final preparations for an attack on the fortified village of Vaux. After securing Belleau Wood, the division shifted effort to the right side of its sector to seize Vaux. The plan, which called for attacking on 1 July, coordinated American pursuit and observation aviation in support of a ground battle for the first time.

This attack included several advantages not available to the valiant but unsupported marines at Belleau Wood. Reconnaissance flights conducted during June helped develop an accurate picture of the enemy situation at Vaux. The division attack order included a detailed map of the village, annotated with the location of enemy positions, barricades, and even the thickness of certain walls therein. The attack enjoyed the support of a schedule of artillery fires designed to suppress enemy machine-gun fire and, in certain cases, destroy observation points and strongpoints previously identified by aerial photographs. Observation airplanes and balloons would adjust artillery fire as the attack progressed, and infantry contact planes would help commanders stay apprised of the location of the forward line of troops.[12]

The plan required command of the air, the responsibility of Maj Bert Atkinson, commander of the 1st Pursuit Group. An insider—one of some 56 qualified aviators on duty with the Aviation Section of the US Army Signal Corps when the United States entered the war—Atkinson had served with Benjamin Foulois's 1st Aero Squadron during the Mexican Punitive Expedition in 1916. The bonds of camaraderie among these veterans of the desert southwest made them a powerful influence in the rapidly expanding American air arm. Now largely forgotten, Atkinson played a central role in the birth of American combat aviation. During the last six months, he had organized, equipped, and trained the Air Service's first pursuit squadrons, forming them into a combat-experienced fighter group.[13]

Atkinson's sense of determination and his single-minded focus on defeating the Germans were his greatest assets. But to his men, the quiet Georgian seemed humorless and severe. As Capt Philip Roosevelt, his operations officer, noted, "He has thrown his whole mind and heart across the barbed wire and there is very little on this side of the German trenches that interests him."[14] Fortunately for the command climate of the 1st Pursuit Group, the witty operations officer with twinkling eyes buffered Atkinson's dourness.

A 1912 graduate of Harvard and cousin of President Theodore Roosevelt, Roosevelt had been military editor of *Aviation and Aeronautic Engineering* (later known as *Aviation Week*) and one of the original members of Raynal Bolling's 1st Aero Company of the New York National Guard. His poor eyesight kept him from qualifying as a military aviator, but as a military-aviation journalist, he had become about as well versed on the subject of aerial warfare as anyone in the United States (a strict policy of neutrality had restricted military-to-military contacts). Immediately after Congress declared war, the Signal Corps brass called Roosevelt to Washington to help plan the aviation mobilization. He impressed Foulois and accompanied him to France, where the latter took charge of the AEF's Air Service. Foulois proved himself the perfect matchmaker when he assigned the talented Roosevelt to assist Atkinson.

Together for almost seven months now, Atkinson and Roosevelt made a great team because they complemented each other so

well. Atkinson instilled his outfit with discipline—no small task, given that most of his pilots had been college students a year earlier. Obsessive about avoiding unnecessary casualties, he insisted on safety precautions that rankled his most aggressive squadron commanders. According to Roosevelt, Atkinson's battle captain and the brains of the outfit, "We agree on all important subjects of tactics, organization, administration, and discipline."[15] The 1st Pursuit Group had established a winning tradition under their leadership, but the days ahead would present great challenges.

Atkinson and Roosevelt found themselves subject to a confusing command organization that resulted from the AEF's inexperience in coalition warfare. Their orders required them to operate under the French Sixth Army, but two different American headquarters also wanted to tell them what to do. Mitchell, who had established his 1st Air Brigade headquarters nearby, thought that he was in charge. So did the 1st Corps chief of Air Service, Maj Ralph Royce, who came to the group headquarters "and said that as far as American orders were concerned we would take them from him and from no one else."[16] Royce's assertion of authority reflected the Army's tradition that the senior American headquarters supervised all American units in its area. Atkinson and Roosevelt steered tactfully through the conundrum of serving three different masters, Roosevelt explaining that "I had to spend a lot of time seeming to obey their orders while really making my own dispositions. . . . All our orders really came from the French—which he [Mitchell] approved."[17]

To be fair, the US Army was still working out the nuances of command relationships between the pursuit and observation groups and the corps and armies they supported. That these units were committed to battle under a foreign army further complicated the matter. Mitchell had authority but little real responsibility because the pursuit group worked directly for the French Sixth Army and the corps observation group worked directly for the US 1st Corps, which had also arrived to reinforce Sixth Army. Nevertheless,

Maj Bert Atkinson

Mitchell's presence was important because it enabled him to organize a tactical headquarters, gain the measure of his men, and observe firsthand army-level air operations during the most intensive air fighting of the war. The Château-Thierry campaign served as his postgraduate education in aerial warfare.

On 30 June, Atkinson ordered his four squadrons to conduct familiarization flights of the new sector. He instructed his units to avoid combat except "in cases where there is an extremely good chance of a successful result." These flights gave the pilots an opportunity to study the terrain, note landmarks on their maps, and reconnoiter routes to and from the front lines. Maj Harold Hartney, commander of the group's 27th Aero Squadron, required his pilots to submit their maps to him that night, properly annotated, for his personal inspection.[18]

For the 1 July attack on Vaux, the group originally planned to fly two patrols over the Sixth Army front during the morning and then surge all of the group's aircraft in three successive waves in the late afternoon to establish air superiority over Vaux during the attack. Early in the morning on 1 July, however, the group's leaders changed the plan to ensure continuous coverage over the battle area throughout the day.[19]

The initial plan, though hastily conceived after the unit's arrival at Touquin, demonstrates that the leaders of the 1st Pursuit Group understood the importance of concentrating their aircraft in large formations from the be-

ginning to meet the enemy threat at Château-Thierry. Atkinson and Roosevelt changed the plan on the morning of the attack, after the dawn patrols had already launched. This adjustment suggests that the role of pursuit aviation in the battle was subject to close coordination. The group's initial plan of covering the battle zone only during the attack was probably deemed unsatisfactory because ground commanders wanted to have air cover over the battle area throughout the day to protect the movement of a significant amount of short-range field artillery forward, out of concealed positions into the open, to support the attack. Friendly artillery planned to begin its program of preparatory fires 12 hours before the infantry assault, reaching a crescendo at H minus 60 minutes. The movements of friendly troops into attack positions during the day needed to be screened from enemy aerial observation to avoid targeting by enemy artillery. The 2d Division's G-2 reported 20 enemy airplane flights over the division sector during the afternoon before the attack. The division also reported 13 enemy flights on the morning of the attack. Leaders of the 1st Pursuit Group scrambled to change their plan to stop these enemy incursions.[20] Philip Roosevelt described the new concept of air operations for the attack on Vaux:

> A very strict barrage of the sector of the attack was maintained throughout the day, and in the evening when the infantry went forward they found themselves perfectly covered by the allied planes. Briefly, the steps in the ladder included infantry liaison planes, corps artillery adjustment planes, and three formations of pursuit [planes] of a squadron each at approximately 2,500, 3,500, and 4,500 meters altitude respectively, the whole ladder, leaning as it were into the German lines so that the planes at 4,500 meters altitude were working from twelve to seventeen kilometers over enemy territory.[21]

Lt Elmer Haslett, an operations officer with the 1st Corps Observation Group who flew in the backseat of an observation plane during the attack on Vaux, remembered that "there was only one time at Château-Thierry when the Boche did not have the complete supremacy of the air. This was on July first at the Battle of Vaux. . . . We had every American pursuit and observation plane we could get off of the ground." Apparently, most of the observation planes aloft were providing close-in protection to two key aircraft with special missions. Haslett continued, "There were not less than ninety-six planes in that formation—their mission being to protect the infantry [contact] plane and to protect [Maj Lewis H.] Brereton and me, who were doing the artillery work. There was such a swarm of planes above us that we practically never looked into the sky, but kept our attention entirely on the work before us." According to Haslett, the air cover was so good that the attack on Vaux seemed like a training exercise.[22]

It did not seem like a training exercise to Lt Harold Tittman, a pilot who had recently joined the 94th Aero Squadron. Tittman was flying in the upper-left position of a V formation of six airplanes led by Jimmy Meissner that had taken off from Touquin at three in the afternoon and penetrated deep into German airspace. As they flew south from Soissons, their route took them close by the bases of JG 1 and 3. A group of seven German fighters, identified by Meissner as Fokker D-7s, attacked his patrol from the sun-drenched western skies, achieving complete surprise. "The first thing I knew about their presence," Tittman recalled, "were the tracer-bullets passing in front of me. I remember seeing one of the German planes headed directly toward me and it came so close that I could even distinguish the pilot's black moustache!"[23]

Anxious to get on the German's tail and shoot him down, Tittman left his patrol—the worst thing he could have done, he later realized. Finding himself suddenly alone, he tried to make his way back toward friendly territory, but five enemy fighters jumped him. Tittman—shot through the right lung, right arm, and right foot—crash-landed, his airplane riddled with 200 bullet holes. His worst injuries, though, were caused by the crash itself, which he barely survived: he lost his left leg and spent the next 22 months in the hospital.

Lt Waldo Heinrichs of the 95th Aero Squadron was in the air for his second patrol that day as H hour approached. His patrol of six airplanes had taken off at half past four that afternoon, but because of "wretched leading" by his inexperienced flight leader, the formation had broken up and Heinrichs found himself in a patrol of only three airplanes. Even at this altitude, the artillery fire on Vaux—more than 11,000 feet below him—was so intense it threw clouds of smoke and dust up to the altitude of his patrol. He noted in his diary that it was "desperately dangerous as Boche came over in droves of 12, 18, and 20. In fact 50, in 3 formations crossed our lines before 8 A.M. this day."[24]

American fighters did not encounter enemy aircraft at the lowest altitudes of pursuit coverage during the attack. Philip Roosevelt's cousin Quentin, the youngest son of President Theodore Roosevelt and a member of the 95th Squadron, was airborne at the same time as Heinrichs but was flying 3,000 feet closer to the ground. "We were scheduled to fly on the low level, at twenty-five hundred meters," he wrote home the next day, "to intercept any enemy photographers or *réglage* [artillery-adjusting] planes. There were two more patrols above us, one around four thousand and one up along the ceiling, keeping off their *chasse* planes. We didn't run into any of their planes." When Roosevelt returned to Touquin, he found out that the top flight had been engaged in a fight with nine Fokkers.[25]

To observers on the ground, it seemed that the friendly pursuit planes had swept the Germans from the sky. The operations officer of the 23d Infantry Regiment, which formed the left wing of the attack, reported that "liaison with airplanes was excellent. Our airplanes overwhelmed those of the enemy. [The] attack seems to have been [a] complete surprise."[26] The 3d Brigade commander, in charge of the attack on Vaux, reported that by half past seven that evening, his troops had secured the village. Complete reports of casualties were not yet in, but he believed the count to be about 200. The Allies had captured more than 600 Germans. "Before closing this brief report," he concluded, "the undersigned cannot refrain from expressing the appreciation of all concerned . . . [for] the excellence of the artillery work, both in preparation and during and after the attack."[27]

The 2d Division's attack on Vaux exemplified the combined-arms approach that General Pershing wanted to see. He called the attack "a brilliantly executed operation."[28] Gen Hunter Liggett, commander of the US 1st Corps, called it "a very skillful piece of work."[29] The contrast between the battles of Vaux and Belleau Wood illustrates the connection between aerial superiority and ground combat. Aerial photographs provided valuable intelligence that served as the basis for attack plans. Observation aircraft adjusted artillery fire during the battle, including devastatingly accurate fires that prevented German reinforcements from interfering with the attack. Infantry contact planes helped ground commanders keep track of the progress of their troops, thus ensuring that friendly artillery did not accidentally kill them. Because of the 1st Pursuit Group's control of the air, enemy aviation did not interfere with the 2d Division's attack. German fighters did not shoot down friendly observation aircraft nor did enemy battle planes strafe American ground troops. Finally, enemy observation aircraft were not able to adjust hostile artillery fire on friendly troops.

The chief of Air Service of the French Sixth Army sent the 1st Pursuit Group written congratulations: "Yesterday's attack was a complete success. The protection given by the 1st Pursuit Group, USA, was very good."[30] Atkinson and Roosevelt must have felt proud to receive such praise from their new headquarters. In a matter of days, they had moved to a new base, integrated themselves into the command structure of Sixth Army, established a new line of logistical support, coordinated their efforts with the 1st Corps Observation Group, and fought America's first air-land battle. They had achieved command of the air against a numerically superior and more experienced opponent. In the greater scheme of things, the counterattack at Vaux stands as a minor action, but in the history of American

airpower, it has become an important milestone. Moreover, the Americans advanced instead of retreated and proved that they could conduct modern combined-arms warfare.

The concentrated appearance of Nieuport 28s over the battle area at Vaux probably took the German air force by surprise. The enemy countered by bombing the 1st Pursuit Group's airfield at midnight that same day. The 12 or so bombs that fell on and around the airfield did not cause any damage, but they signaled that the German air force was now fully aware that an American pursuit group had arrived to challenge it for control of the skies.[31] As Harold Buckley, a pilot in the 95th Aero Squadron, forebodingly warned, "No longer would we hunt in pairs deep in the enemy lines, delighted if the patrol produced a single enemy to chase. Gone were the days when we could dive into the fray with only a careless glance at our rear. There was trouble ahead."[32] □

Notes

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The 1909 Wright Military Flyer

CHARLES TUSTIN KAMPS

Orville and Wilbur Wright, of Dayton, Ohio, produced the first airplane in 1903 but were rebuffed in their initial attempt to interest the Army in it in 1905. They would not receive a sympathetic hearing until August 1907, when the Aeronautical Division of the Signal Corps was formed with just three men to take charge "of all matters pertaining to military ballooning, air machines, and all kindred subjects," in the words of Brig Gen J. Allen, chief signal officer of the Army. This event marked the humble beginning of what would become the US Air Force.

The Army solicited bids for an airplane that could pack for transport by wagon, be assembled for operations within one hour, seat two persons (a total of 350 pounds), have a range of 125 miles, attain a speed of 40 mph, and have a flight endurance of at least one hour. The basic cost would be $25,000, with bonuses or penalties for actual performance. Of 24 bids received, the Wrights' proposal produced the only workable airplane, and they were duly awarded a contract to deliver "one (1) heavier-than-air flying machine, in accordance with Signal Corps Specification No. 486, dated December 23, 1907," according to the agreement approved by General Allen.

Fort Meyer, Virginia, was the site of the official flight trials in September 1908. Orville Wright piloted the prototype for the Army, taking several members of the acceptance committee aloft to show off the capabilities of the airplane. In what turned out to be the last flight of the test series, Orville failed to recover from a dive, and the resulting crash killed his passenger, 1st Lt Thomas E. Selfridge, an official observer and one of the original Army-aviation enthusiasts. Despite this bad luck, the

Army was impressed by the Wright "flying machine" and ordered further tests.

The Wrights improved their design and presented the new "1909 Flyer" for examination at Fort Meyer during 27–30 July 1909. With a length of 28 feet, 11 inches, and a wingspan of 36 feet, six inches, the Flyer stood nearly eight feet tall and weighed in at 740 pounds. Driven by the Wrights' own 30.6-horsepower, four-cylinder engine, the plane could fly 42 mph and stay aloft over 70 minutes. Exceeding specifications, the machine was accepted as Signal Corps Airplane no. 1 on 2 August.

At College Park, Maryland, the Wrights trained several young lieutenants as pilots in October. A latecomer to the class, 1st Lt Benjamin Foulois didn't get enough instruction to solo but took the Flyer with him to his next duty station—Fort Sam Houston, Texas. Between March and September 1910, Foulois literally taught himself to fly, with help from letters from the Wrights. This must surely be the first instance of learning to fly by correspondence! After some 62 flights by Foulois, the Army's first airplane was retired in 1911.

To Learn More . . .

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Airpower, Jointness, and Transformation

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AWC SEMINAR SIX*

Editorial Abstract: In the second century of manned flight, airpower may well be the transforming piece of the jointness puzzle—the instrument through which ground and naval forces could be integrated. An Air War College seminar, class of 2003, studied, debated, and developed personal convictions about this argument. Grounded in the history of the evolution of airpower theory, this seminar developed a new definition for a "transformational system" to focus on the future of war fighting and force structure.

THE AIRPOWER DEBATE is currently at the century mark, and during those 100 years the landscape has shifted considerably. At the outset, air forces were grown from within the Army and Navy. Near the midpoint, airpower advocates argued for—at a minimum—a separate-but-equal status. In the New Millennium, airpower may well be the last piece in the *jointness* puzzle—the piece that transforms the disassembled parts into a work of fine art. Members of an Air War College (AWC) seminar in the class of 2003 studied, debated, and developed personal convictions about these arguments during their in-residence year of study.[1] Their interesting conclusions were captured and integrated into this article, which begins with a short, but necessary, review of the historical and theoretical foundations from which their discussions in the college's Warfighting course can be best appreciated.

An examination of airpower as an element of national strategy does well to begin with a review of the maritime, continental, and airpower theories of Alfred T. Mahan, a US Navy captain; Sir Halford J. Mackinder, a British scholar; and Giulio Douhet, an Italian general. All three argued that geography, technology, and other local circumstances come together in unique and dramatic ways to give nations comparative advantage on the international scene. However, each of their theories leads to different conclusions with respect to the importance of ground, sea, and air

*This article reflects the discussions and writings of the AWC professors and students participating in Seminar Six's Warfighting course. In addition to the professors above, the students were Gp Capt Michael Adenlyl, Nigerian Air Force; Lt Col Daniel Baltrusaitis; Lt Col Randy Bright; Lt Col Mark Carter; Lt Col (P) Kendal Cunningham, USA; Lt Col Mark Fitzgerald; Comdr Ed Gallrein, USN; Lt Col Theresa Giorlando; Lt Col Makis Kaidantzis, Hellenic air force; Col Mun Kwon; Lt Col Glenn Lang; Lt Col Sarbjit Singh, Republic of Singapore Air Force; Mr. John Steenbock, USAF civilian; and Col William Walters, Tennessee ANG. These contributors are now AWC graduates, class of 2003.

forces. These theories are briefly reviewed to provide the reader a strategic framework similar to that of our seminar participants.[2]

Mahan, writing in the late 1800s, was the first of the three strategists to share his theories and stressed the importance of naval power—particularly its mobility and ability to control commerce over the high seas and through strategically located "choke points." Through sea power, a nation at that time could guarantee its own economic and physical security and dictate the security of others. According to Mahan, a nation that wanted to be a Great Power also needed to be a great sea power. The US Navy—and President Teddy Roosevelt—embraced this thesis. Sea-power enthusiasts still use Mahan as their starting point when discussing and debating the relevance of naval forces in modern times.

As usual, theory begets theory. Not long after Mahan's original thesis gained popularity, Mackinder first critiqued Mahan and then provided an alternative framework. He observed that Mahan's theories had focused on England at a time when sea power was the dominant means of commerce—well before roads and railroads had matured on the Continent. According to Mackinder, Mahan's ideas were only temporally correct. If a nation sought to become a Great Power, Mackinder argued that it also needed to be a great land power, capable of using its army to defend its interests and extend its influence.[3] The armies on the Continent and around the world found his arguments attractive and still use those concepts to forge their arguments on force structure and grand strategy.

Later, after the advent of the airplane, Douhet argued that the technology of powered flight had changed the intellectual and strategic landscape—forever altering the context on which the theories of Mahan and Mackinder had been developed. Airpower, he said, diminished the importance of geography as an element of national power. Douhet was later joined by William "Billy" Mitchell, Alexander P. de Seversky, and others, who said airpower now provided a means by which armies could battle navies—meaning the two military forces were no longer separate and distinct. They added that it would be possible for nations who were great distances apart to wage war to its ultimate end through airpower alone.

As Mahan developed his theory, using eighteenth-century England, and Mackinder developed his, using a maturing commerce system built on roads and railroads, Douhet's views on the potential of airpower were conceived while witnessing the stalemate of trench warfare during World War I. Since the concepts of each strategist were reflective of different and unique landscapes, Douhet's theories may also be viewed as only temporally correct—being equally limited to local circumstances, as were the ideas of Mahan and Mackinder. The logical conclusion of this interpretation of Douhet makes a good case for the preeminence of airpower's being a function of local circumstances—an argument equally as solid as the arguments for the maritime and continental schools.

Interpreted more aggressively, Douhet's theory placed airpower in a superior position to either maritime or ground power as a means of warfare for two reasons.[4] First, airpower diminished the consequences of either a strong navy or a strong army as a means of defense because either could be bypassed by airpower. Second, with the advent of airpower, neither a strong navy nor a strong army could determine the outcome of a conflict without an accompanying airpower capability. However, airpower could—in Douhet's theory—determine the outcome by itself.

This more aggressive interpretation led to a conclusion that airpower was no longer bounded by local circumstances and, as a consequence, airpower theory should be viewed as a general theory through which the maritime and continental schools could be integrated. In any case, airpower was a theory, and a force, with which both the Army and Navy had to reckon. Whether it was an equal or a superior integrating theory remained to be seen.

World War II tested various airpower theses, including Douhet's. While the employment of airpower differed considerably from theater to theater, campaign to campaign, and

commander to commander, and while arguments still abound on the effectiveness of specific uses of airpower, little doubt exists with respect to the overall effectiveness of airpower throughout the war. The evidence of airpower's effectiveness lies in the fact that Army, Navy, and Marine aviation grew by leaps and bounds as the war progressed, and control over air assets was jealously guarded throughout.

Given the perceived effectiveness of airpower in World War II, the postwar airpower debate in the United States was cast into three propositions. First, airpower was the chattel property of the Army and Navy. If so, then no organizational changes were required, and airpower doctrine could be developed within the confines of the maritime and continental schools of thought. A second proposition considered airpower as a great integrating force, with the organizational implication that the Army and Navy should merge into a joint force under a general staff. Finally, the proposition that won the day held that since airpower was sufficiently unique, it needed to be treated as an independent school of thought and given independent status through a formal organizational change. Said another way, airpower deserved a separate-but-equal status to develop its own doctrine and force structure—free from the ingrained structures of the Army and Navy.[5]

Although the third proposition won the day, it had frayed edges—some of which were mended and patched along the way, but none of which would completely disappear. These frayed edges shaped much of our seminar debate as contrary opinions, unsettled disputes, and counterexamples littered the landscape as our discussions ranged from Korea to Vietnam to Operation Anaconda. Several members of the seminar never let us forget the alternative points of view on *close air support*, the *fire support control line*, management of air defense or airspace in general, control of service (especially Marine) air, and how the joint force air and space component commander (JFACC) should be selected.[6]

However, as valuable and intense as these exchanges were, it wasn't the frayed edges that advanced our understanding of airpower as much as it was the common threads and our appreciation of the Air Force's own internal struggle as it sought to define itself. Depending upon the circumstances, the validity of the various supporting arguments would shift, and a different basic proposition would dominate—the chattel-property, the separate-but-equal, or the fully integrated positions. As the participants shared their thoughts, they came to the conclusion that the propositions were resolved after the high-intensity combat action ceased in Operation Iraqi Freedom (OIF). From our perspective, the decisions of 1947 gave the Air Force the opportunity to successfully mature its doctrine, and it did so during the ensuing years—but the process wasn't pretty.

The Air Force internal debate was polarized along two axes—the fighter-versus-bomber and the conventional-versus-nuclear debates—and was framed by the terms *tactical* and *strategic* as they were applied to war. Organizationally, this played out as a duel to the death between the Air Force heavyweights, Tactical Air Command (TAC) and Strategic Air Command (SAC). Readers should recall that, beginning with the Eisenhower administration and its nuclear-dominant New Look policies, SAC was given the immediate upper hand. Under this policy, the term *strategic* was equated with SAC's long-range, bomber-delivered nuclear forces. TAC and conventional war were given the backseat to bombers and the ultimate destructive weapon. Bombers mattered; fighters were marginalized.[7] Nuclear forces mattered; conventional forces didn't, except as a trip wire. Airpower doctrine was simple: SAC thrived, TAC seethed, and the Army and Navy looked at the Air Force and its burgeoning budgets with envy.

President John F. Kennedy's reassessment of strategic nuclear forces, the Warsaw Pact, and Vietnam changed the ball game. President Kennedy rightfully questioned the credibility of a national defense policy based on a near-automatic escalation to a central-system nuclear exchange. In President Kennedy's opinion, there needed to be some flexibility and middle ground—a precursor to a terminal

decision. At the same time and to counter communist global expansion, President Kennedy moved the nation into a small-scale war in Vietnam. The shifting winds of war forever altered the debates in the Air Force and those about airpower.

In the theoretical-war realm, the nation's nuclear war plan (the Single Integrated Operational Plan [SIOP]) erased the simplicity of equating Air Force heavy bombers to US nuclear forces as Air Force land-based missiles and the Navy's submarine ballistic missile forces were added. In Cold War Europe, NATO (at the insistence of the United States) set about to change its "Overall Strategic Concept for the Defense of the North Atlantic Treaty Organization Area" from the "trip wire" strategy documented in its Military Committee Document (MC) 14-2 to "flexible response" in MC 14-3—a process specifically designed to strengthen the bridge and blur any distinction between conventional (theater/tactical) forces and US strategic nuclear forces. In the "hot war" in Southeast Asia, nuclear weapons were not seriously considered, even as the war in Vietnam worsened. SAC's bombers and tankers were sent to Southeast Asia to drop conventional weapons or refuel fighters, while SAC's spokesmen worked to find ways to claim the SIOP had not been degraded (much, for long, or significantly). The clear lines that framed the debate over airpower in the '50s became blurred throughout the '60s and '70s.

Along the way, airpower got another test in Vietnam. There is not enough space in this article to do justice to the topic of the air war in Vietnam. USAF forces were directed by a perverse combination of air divisions, numbered air forces, major commands, and component commands—all tossed into a blender with the air forces of other services and other nations. Everybody got his own air war—his own way. This multiservice, multinational circus eventually became a daily competition among the participants to fly the most sorties and drop the most bombs—none of which had anything to do with battlefield effectiveness.

By the early '70s it was very difficult—perhaps meaningless—to differentiate between strategic and tactical forces. The US/NATO objective of *extended deterrence* intentionally linked a US strategic nuclear response to a conventional USSR/Warsaw Pact attack—making the so-called *nuclear threshold* a more important concept than any definitional distinction between strategic and tactical. Vietnam sent the terms *strategic* and *tactical* through the semantic blender as tactical fighters went north to bomb strategic targets and strategic bombers hit tactical troop concentrations in the south. All the while, extensive news reporting of the war in Vietnam drove home the fact that even very low-threshold (tactical) events could have strategic consequences. Without a dividing line between the terms *strategic* and *tactical*, the concepts that had framed the internal Air Force debates became meaningless at about the same time the US military went into a flat spin at the end of Vietnam—which, to many, appeared to be beyond its ability to recover.

No doubt the end of the Vietnam War brought a catharsis for the nation and the military. In the opinion of our seminar, it also laid to waste the internal Air Force arguments about airpower. By the mid-'70s the nuclear arena was no longer the sole purview of a USAF-led SAC—a SAC that would eventually see an admiral as CINCSAC before it disappeared into the archives. There were serious arguments with respect to eliminating both the land-based missiles and bombers in favor of a sea-based nuclear deterrent. In any case, our nuclear retaliatory strategy was being severely questioned because its logic inevitably was underpinned by the illogic of a US-USSR central-system nuclear exchange, and arms control was approaching its heyday. As a consequence, NATO's belief in extended deterrence and linkage was eroded and would eventually have to be bolstered by upgrading the intermediate (theater) nuclear forces with systems that could extend beyond Eastern Europe and strike the homeland of the USSR—making these systems "strategic" to the USSR, while the United States sought to designate them as "theater" weapons—thus

forever erasing any difference between the terms *tactical* and *strategic* in the nuclear realm.

Airpower's fundamental doctrine of strategic bombardment had run into the harsh world of political reality where national leaders determined targets, allowed sanctuaries, believed in graduated responses, and justified strategic bombing in terms of leverage at the peace talks. In retreat, its supporters argued that strategic bombardment had not been tested because the strategic targets of Korea and Vietnam were in China and Russia. By the middle '70s, the Air Force had lost its hammerlock on nuclear deterrence, and its major tenet, strategic bombardment, had been proved infeasible, irrelevant, or (in the nuclear case) unthinkable. The nation was in malaise, the Air Force reeled, SAC shook at its foundation, and TAC continued to seethe.[8]

Certainly for the Air Force and probably for the nation as a whole, the post-Vietnam period of the '70s was characterized by inactivity and stagnation—the United States found it could do nothing to respond to the Soviet invasion of Afghanistan except boycott the Olympics. President Jimmy Carter announced the formation of the Rapid Deployment Force (RDF)—which specialists quickly pointed out was neither rapid, deployable, nor a force. The nation was going nowhere, fast.

In the calm before the coming storm, vulture-like critics saw the Air Force adrift, cawed that the nation had not won a war since the Air Force had been created, and tried to eliminate the service and return the chattel property to the Army and Navy where it should have remained all along. As the scavengers circled and the ship of state sat mired, the "prodigal" soldiers were rising in the ranks, looking to create a new sense of order, discipline, and purpose across all of the military services.[9] Inside the Air Force, TAC's generals were gathering strength and setting a takeover course under Gen Wilbur L. "Bill" Creech. At the same time, space operations began to show promise as a military arena, specifically as an Air Force arena.

Although space brought a rainbow of resources, it also darkened the skies over the Air Force. The seminar saw that space could be a threat to the Air Force because a number of the arguments for a separate-but-equal space force were similar to the arguments used to justify a separate-but-equal Air Force during World War II. If those arguments were successful, they could be used to eliminate missions and reduce the Air Force in favor of a separate space service. However, space was the true high ground and presented a special opportunity for the Air Force. It could, potentially, become the medium through which all military forces would be integrated—recalling the second proposition in the 1947 arguments. The opportunistic side of the equation was reinforced dramatically through the Strategic Defense Initiative (SDI)—President Ronald Reagan's vision to provide the West with a multilayered defense against the Soviet missile threat. SDI brought the Air Force vast resources as well as a means to replace nuclear forces as the basis for deterrence. The Air Force, wisely, sought to hang onto space. Internally, however, the debate raged between space advocates, whose battle cry was "integrate or separate," and aviators fending off assaults behind the shield of "not now, but someday." The space debate looked and sounded very much like the independent Air Force debate that raged decades earlier.

Under a shower of resources from Reagan-era defense budgets, Air Force leaders awkwardly grappled with the questions Were we an aerospace service or an air and space service? and Was the arrangement a marriage on the verge of divorce or a pair of new lovers on the verge of a more serious engagement? Was space a "place," meaning an area of responsibility (AOR) for Space Command, and would it be given a control over space resources, along the lines of US Special Operations Command (USSOCOM)?[10] Would the Navy's space organizations be adopted into the family or treated as a trust until the age of maturity? What would be the relationship between the Air Force and the National Reconnaissance Office (NRO) on space-related issues, and how would strategic intelligence be partitioned and controlled between and among

the services, National Imagery and Mapping Agency (NIMA), National Security Agency (NSA), and eventually Air Intelligence Agency (AIA)? These are seminal questions and parallel to the questions asked in the early stages of airpower development.

By the end of the '80s, the Air Force might have been in disarray—torn in nearly every direction—had it not been for the wealth of resources made available in the early 1980s. The Air Force did not have to decide between bombers and fighters for its future—it could have both, plus a new missile and an increase in airlift. The Air Force thus dodged a bullet, and its many internal and external protagonists begged off the fight in favor of using these newfound resources to tend to their individual service or parochial needs. In that same decade, the Goldwater-Nichols Department of Defense Reorganization Act of 1986 became the legislative framework for future joint integration. However, the decade ended with the defense budget on a downward trend, and the same arguments that had been submerged by the flood of resources threatened to surface with a vengeance.

That storm arrived in the form of Operations Desert Shield and Desert Storm, which came as a surprise to most and as a blessing to the Air Force. Iraq's invasion of Kuwait caught nearly everybody off guard. Many experts predicted the United States and its coalition partners would experience heavy casualties and perhaps even fail. As the liberation of Kuwait unfolded, we found that the team of senior military leaders—who, as junior officers, swore to change things after Vietnam—had succeeded. To many observers, airpower decided the outcome of the war. Coalition air forces pounded Saddam Hussein's military and crippled Iraq's command and control apparatus. Precision-guided munitions (PGM) supplemented unguided ordnance and achieved the highest-ever rate of targets destroyed, and commanders had unprecedented visibility into the battlefield. When ground action commenced following nearly six weeks of relentless air attacks, what remained of the Iraqi army was routed in 100 hours of fighting. Despite the scope and scale of the fighting, coalition and US casualties were far fewer than predicted—a result many attributed to the effectiveness of the air campaign.

Considering this thumbnail history of the evolution of airpower theory, our seminar opened one of its sessions with the proposition that Operations Desert Shield and Desert Storm had validated airpower as the decisive force Douhet and others envisioned and in turn that the Air Force was the supreme integrator of military force. The seminar members roundly trashed that proposition. "No!" was the kind-and-gentle version. Our seminar members recalled that at the time of the Iraqi rout, similar expressions of exuberance were (correctly) judged as incorrect and inappropriate.

Although seminar members noted that the operational effectiveness of airpower had been impressive, their primary interpretation was that Operations Desert Shield and Desert Storm had succeeded when a number of technologies and geography merged to create a landscape of comparative advantage for the United States and its coalition partners on the battlefield—not because of an inherent superiority of airpower over land or sea power.[11] Seminar members also believed that Operations Desert Shield and Desert Storm highlighted the need for the United States to have partners in future military actions and that those operations had forecast the continuing probability of large-scale conflicts—but that such conflicts would never have the predictability that a NATO–Warsaw Pact scenario had during the Cold War. Instead, they believed that even large-scale conflicts would be characterized by their ad hoc nature, with the only common element being the absence of US ground forces at the start. This led them to discuss David A. "Dave" Ochmanek's concept of a "new calculus," whereby the United States would move into future wars with air forces—of all services—being the leading edge, followed by naval forces (including lighter ground forces), and then by heavy ground forces.[12] Finally, our seminar considered Operations Desert Shield and Desert Storm to be

the first operational examples of modern joint warfare.[13]

From the tactical level of Operation Desert Storm, it was obvious to the seminar that PGMs permitted a new type of targeting and that new weapon technologies could generate a level of target damage nearly equivalent to that of a nuclear weapon but without its fallout (physical and political). At the strategic level, it was equally obvious that airpower could be used to rip an enemy apart from the inside, quickly and with greater efficiency than ever before—well ahead of a ground attack. Those air attacks could be accomplished using whatever means were available and from great distances.

Much of this war was orchestrated through the combined air and space operations center (CAOC), which brought together strategy, tactics, and intelligence to produce an air tasking order (ATO) that worked in consonance with the joint force commander's overall campaign plan through the JFACC. Finally, the Air Force had an organizational structure that lent itself to combat.[14] Although the process bogged down from time to time, it was clear that the ATO was no longer destined to be a time-late mechanical process for servicing an endless target list with insufficient weapons—it was now a process that thought through and executed an air campaign as part of a larger campaign. Airpower was no longer marching to its own beat, generating an ATO based on dated requirements. It was finally centrally managed, at the heart of the first phase of a major operation, and did reasonably well.

The seminar's consideration of airpower in the 1991 Gulf War brought us full circle, back to the theoretical debates surrounding the "transformational" arguments of Mahan, Mackinder, and Douhet. It also begged for a definition of *transformation*—a definition that would allow us to differentiate between systems, programs, or other proposals with respect to whether or not they were transformational; a definition that could be useful to judge the relative differences between those programs, systems, and proposals considered transformational. We quickly found the various DOD definitions either all-inclusive, meaningless, or both—so we set out to construct our own definition.[15]

Our search for a definition of transformation began with a historical look at those systems that were considered transformational. If we could agree on a list of transformational systems and what made them so without the aid of a specific definition, then we might ask what systems would generate the same order-of-magnitude changes in the future. From there, we might "back into" a working definition of transformation.

The list of systems we identified as transformational included tanks, mobile artillery, aircraft, aircraft carriers, radar, radios, computers, submarines, and satellites and their combinations (e.g., radios in tanks, radars on aircraft). The seminar considered other examples and made numerous excursions, but at the center of our discussions we found two common threads among the systems we had identified as transformational—they increased the ability of commanders to use forces in concert, or they gave commanders better visibility of the battlefield.

Now, working backwards, the seminar defined a "transformational system" as one that *added transparency to the battlefield and/or that allowed commanders to bring forces together in an integrated and in an abruptly more effective fashion*. These sorts of systems led to doctrinal shifts and generated a transformation in the use of military force. Using this definition, Operations Desert Shield and Desert Storm certainly demonstrated that a considerable degree of transformation had occurred. Similarly, this definition would allow us to judge proposals with respect to how they would increase transparency, force integration, and increase effectiveness, and the degree to which they would demonstrate one or more of these transformational attributes. The seminar would eventually use this definition to evaluate future force programs.

In the meantime, we now turn back to the flow of seminar conversations at the point where we take up at the end of Operation Desert Storm. As we saw it, once Desert Storm

had concluded, issues remained to be settled inside the Air Force. SAC and TAC were increasingly seen as Cold War relics—one structured for a world that would never be again, and the other more philosophically suited, but not structured, for the world that was. Operations Desert Shield and Desert Storm had finally erased any differentiation that may have still existed between the words *strategic* and *tactical* with respect to labeling aircraft and forces—the root words that once defined the two commands. So-called tactical fighters accomplished strategic attacks while strategic B-52s hit deployed Iraqi units hunkered down in the open desert—tactical operations in the formulation of an earlier period.[16] Thus, internal debates needed to be resolved before the Air Force could move forward, and our seminar saw the conclusion of Operation Desert Storm as analogous to a stellar convergence. As one member described the outcome, "In a Saddamesque move, the chief slew both antagonists and created a new organization in his own image. Gen Merrill McPeak gave rise to Air Combat Command (ACC) out of the ashes of SAC and TAC. Military Airlift Command [MAC], the red-headed stepchild, was morphed into AMC (Air Mobility Command) and sent to [US]TRANSCOM [US Transportation Command] to be properly reared."

Following the creation of ACC, Air Force leaders set out to improve the ability of the JFACC (a prized joint role) to command, control, and execute air and space forces by creating a standardized air and space operations center (AOC).[17] The AOC was designed to link the JFACC to higher command (military and civilian) as well as other component commanders through effects-based operations (EBO). Higher levels of command, in the EBO concept, determine the "effect" to be created and leave the "how" of creating that effect to lower echelons.

Effects-based tasking creates a long-sought-after conceptual shield and protects air assets from those who would otherwise select targets and direct sorties—micromanage from higher command. The EBO concept also allows the internal AOC process to exhibit creativity and take advantage of its expertise. Airpower experts in the AOC now have the latitude to apply their specialized skills and technical knowledge to create the effects specified by senior commanders, rather than simply selecting aircraft from a grab bag of air assets to service a target list at a designated level of damage. A repeatable sequence within the AOC, which runs from guidance through execution to assessment, has stabilized the JFACC/AOC relationship and provided the basis for an organizational learning curve. In the period following Operations Desert Shield and Desert Storm and throughout subsequent engagements in the Balkans, the Air Force solidified the AOC concept and wrestled with engraining EBO into the command and control process—especially in the targeting process. Although not all efforts were successful, progress was made.

Believing that so many things were on track for the Air Force after the post–Gulf War decision to reorganize the service, our seminar had to wrestle with the question of whether or not 11 September 2001 had "changed everything." As we saw it, our military forces were indeed set in motion according to a "new calculus." The air forces—of all services—were the first to the fight, which were followed shortly thereafter by navy and ground forces—all in concert. We had the right forces, and they worked extremely well together, in very short order. The Air Force, ACC in particular, responded well that day, nearly intercepting one of the flights before it impacted. The Air Force went on to establish a homeland-defense air umbrella and maintained that umbrella for a considerable period of time. Shortly thereafter, the Air Force joined with other forces in Afghanistan to wreak havoc on the Taliban—nearly from a standing start. If ever it can be said that the nation and its services were led by the right people at the right time, it was at that moment on 9/11 and in the fights that followed. So, the events of 9/11 had not "changed everything," but they had validated jointness. Those events had also created a sense of urgency for "transforming" our forces so that they could be leveraged

against enemies, and in manners, we could not have foreseen prior to 9/11.

Our seminar carefully watched as circumstances unfolded in the preparations for Operation Iraqi Freedom (OIF). Our speculations about the plan were as varied as those of the experts on television. We laid out mock *commander's assessments* and proposed *courses of actions*. We analyzed force packages, and we shifted political and military objectives around during our AWC Warfighting exercises. In the end, we were still shocked and awed with the speed of advance and the broad range of success the real-world military operations enjoyed. At day 10 the seminar returned to Douhet's theory and asked, "Was *airpower superiority* demonstrated during OIF?" That proposition was once again trashed! "No, no, no!" was the still polite, but more intense, response.

In our view, OIF validated jointness, not airpower in and of itself. But in validating jointness, OIF gave credence to the argument that airpower was the instrument through which ground and naval forces could be integrated—hence Douhet's airpower was the superior theory, and airpower was the instrument through which military forces could be integrated and synergy achieved. This was made possible because intelligence and information technology fused the battlefield into a single piece, eliminating the importance of geography except as terrain was used to hide or harden targets. Airpower—because of its intelligence and information technology, and its comparative advantage over physical geography—integrated the battlefield and made jointness possible.

The CAOC (combined AOC) concept worked—the Air Force had provided the JFACC with a system through which airpower could be integrated with the combatant commander's plan and through which air, ground, and naval forces could be synchronized. It was through airpower, but not by airpower alone, that the plan was executed. But airpower allowed an application of military power superior to anything that would have ever been possible by either a naval- or ground-force-dominant approach. OIF proved the case for transformation, and the success of the CAOC supported the argument that airpower completed the picture and brought all of the forces together into one coherent whole. In this landscape, influenced by the legislative dictates of Goldwater-Nichols, the opportunities presented by the end of the Cold War, and a variety of other factors, the AOC provided a crucible and EBO a catalyst to fuse computer and satellite technology into Douhet's more comprehensive vision of airpower—an integrating force and, potentially, a superior architecture for conducting war.

Given the AOC's critical function in the very successful employment of airpower and its role as an integrating architecture, our seminar emphasized the importance of institutionalizing the AOC concept. The AOC currently enjoys a high level of interest among senior Air Force and DOD leaders. That interest helped energize a historically sluggish AOC system throughout the Balkan conflicts of the '90s and has continued to help generate rapid and appropriate integrated force responses in the Afghanistan conflict and OIF. As OIF winds down, this continuing interest is being used to channel resources to the new AOC regimen. The AOC/EBO framework has to be engrained—institutionally internalized. We cannot allow it to atrophy when the top Air Force leadership changes. A failure here could mean that we in the Air Force will fall victim to our own past, and airpower will likely be viewed as little more than airborne artillery, as it once was.

At its core, the Air Force needs a baseline AOC architecture for procedures, hardware, and software. This seems within reach. In addition to this architecture, the Air Force will need personnel plans and policies to create, maintain, and exercise AOC proficiency. This could be the most difficult challenge. Several members of our seminar expressed concerns that AOC training would eventually become "yet another additional duty" on top of a personnel system already stretched thin by an excessive operations-and-personnel tempo.[18] If the AOC is to succeed, it must become an in-

tegral part of the overall professional military education track for officers—specifically, it should not be confined to aviator education. The AOC and EBO are enabling concepts to the theory and application of airpower—and to transformation, as we have defined it—but they come with a must-pay personnel bill.

Although few doubted the Air Force leadership commitment to institutionalize the AOC concept, members of the seminar expressed reservations about the efficiency and effectiveness of the operational intelligence (OI) and information warfare (IW) links to the CAOC. Rapid OI feeding into the AOC keeps the ATO cycle from bogging down and reinforces the EBO concept. IW leverages the battlefield transparency provided by OI and drives the enemy into a state of confusion. However, both OI and IW depend on organizational structures well outside the AOC's control. Our seminar expressed reservations with respect to the spaghetti-like command links among US Space Command (USSPACECOM), US Strategic Command (USSTRATCOM), US Northern Command (USNORTHCOM), and the NRO. Internal to the Air Force, it was not clear how the current command relationship among the AIA, Eighth Air Force, ACC, and NSA would create a cohesive, responsive OI and IW capability for the JFACC and, in turn, the combatant commander. The current arrangements were bewildering and beyond our comprehension.

Effects-based operations are key to the AOC's successful employment of airpower. However, it is very difficult to exercise EBO if a significant number of the targets—particularly those whose destruction would cause the desired effect—is placed off limits, or if we stop thinking about airpower at the "end of major hostilities." This does not denigrate senior civilian leadership's prerogatives and influence on targeting—that will come and go with the combatant commander's style and the nature of the conflict. This issue goes deeper. As OIF unfolded, it became painfully obvious that our definition of *noncombatant*, our framework for the *laws of armed conflict*, and the derived *rules of engagement* need to be updated to reflect a new type of enemy.

It is absurd to designate as noncombatant a segment of the population that gives direct support to a tyrant and without whose help that tyrant would fall. It is equally absurd that we should be restrained from attacking places of religious, historical, or cultural significance while at the same time the enemy uses these facilities as bunkers or launch sites. The case of child warriors, homicide bombers, and contract killers presents an especially perplexing problem for the United States. We have to find a better way to deal with it than allowing our soldiers to be blown to bits by noncombatants who have been placed on a death march by their tyrannical masters or by postconflict mercenaries paid by the sinister forces who benefit from continued chaos. Most of these situations were handled well in OIF, but their solutions appear to be ad hoc. A systematic, engrained approach is needed—an approach that runs the full gamut of military operations, including winning the peace. The legal community and advocates of airpower must commit themselves to the necessary efforts to sort out these important issues.[19]

Several of our seminar members also made the point that airpower's contribution to our ground and naval power cannot stop when major hostilities wind down—our thought process has to follow through to winning the peace and cannot include a return-to-base mentality while our Army and Marine comrades are still engaged on the ground. Again, while we appear to be successfully working this problem in OIF, whatever approach we come up with must be engrained in the system, supported with personnel, and practiced.

As OIF unfolded with its dramatic successes, we approached the end of our time together as an AWC seminar.[20] During those final weeks, we tested our various ideas in exercises dealing with (among other things) human-rights operations, interventions in strife-torn failed states, noncombatant evacuation operations, Berlin airlift–type situations and scenarios requiring a "forced entry." In each circumstance, we returned to the themes of the

course—determining how to apply force, especially airpower, and determining whether or not we were organized, trained, and equipped to fight in the manner we believed would be necessary. As one might expect, the final examination consisted of one question on war fighting and another dealing with future force structure.

The force-structure question asked our seminar members to identify and defend their choice for their first and last priorities for future aviation programs in light of multiple, competing demands for aviation assets by the service, the secretary of defense's Transformation Planning Guidance, and the emerging "capabilities based" force structure. In addition, they were asked to discuss their choices with regard to coalition warfare, technology transfer, and foreign military sales. Although it is not possible to summarize all the answers (because they varied greatly) or even the best answers (because the best answers often supported exact opposite positions with superb logic and arguments), it was, however, possible to extract useful insights. Those thoughts are summarized as they relate to three issues: the F/A-22, the high-demand/low-density (HD/LD) assets problem, and interoperability.

Those members of the seminar who elected to defend the F/A-22 as the top force-structure priority for the Air Force provided more clearly developed arguments for that position than the Air Force has done in its real-world explanations. Air Force leaders have not yet succeeded in their efforts to present the F/A-22 in other than Cold War terms. Opponents of the F/A-22 have gained the upper hand by asking what existing "threat" the F/A-22 was needed to counter—for which there is no good answer. Another approach might work better. Members of the seminar chose to defend the F/A-22 on the basis of its systems contribution—allowing all forces access to the battlefield so that their integrated capabilities might be used in concert and for increasing the battlefield's transparency (i.e., in support of transformation as we had defined it). The F/A-22 is not an end to itself, but a means through which other elements of our armed forces can be integrated and executed more effectively.

The very best responses used the "new calculus" logic for going to war (developed earlier, see endnote 12), and, in that view, air forces—of all services—stand the greatest probability of being the first US forces to be engaged. Those seminar members saw the F/A-22's ability to make a forced entry into any environment, through which other elements of US power could be applied, as the key enabler in any future US strategy. Throughout our Warfighting course discussions, most members of the seminar expressed the view that the Air Force needed to make a stronger case for the F/A-22. That much stronger case can be made using the logic expressed in those final examinations—the F/A-22 leverages other US forces and opens options for combatant commanders.

Second, many respondents viewed fixing the HD/LD assets problem as their top priority. Recent operations have placed an extraordinary demand on the specialized equipment and personnel that are categorized as HD/LD assets—systems such as the E-3A airborne warning and control system (AWACS) and EA-6B electronic jammer. Clearly, a "high demand" represents the combatant commander's (customer) preference, and "low density" reflects a failure of the services to meet that demand—a sort of "market analysis" approach to setting priorities. The more elegant and insightful responses tied the HD/LD market analysis to our definition of transformation—noting that most HD/LD assets give access or visibility to the battlefield and/or aid combatant commanders in orchestrating forces (battle management). These respondents described two aspects that drive a proper support response—a user pull (market analysis) and a provider push (transformation)—giving extra impetus to their recommendations.[21]

Third, one member of the seminar veered away from selecting a "platform" for the top priority and, instead, wrote a superb defense of education, training, and exercise as the top across-the-board priority. The respondent began by noting that coalition warfare and

interoperability are nearly synonymous. Then, if transformation involves bringing widely diverse military capabilities together in the battle space, interoperability is also a key measure of transformation. With the double importance of interoperability, we need to recognize that successful interoperability is not simply a function of hardware or software, but that training and establishing well-understood, common procedures generate it. That seminar member continued and made the case that no matter how well concepts or systems worked in theory or on the test range, they would fall apart if it was the first time they were used. Likewise, no matter how poor the procedures or equipment were designed, it could all be made to work if people were given the opportunity to work the system for a while. This opinion seemed to resonate throughout the seminar as other respondents also noted that education, training, and exercises would boost the success rate for coalition warfare—a conclusion our seminar thought important.

When our seminar came together following the final examination and culminating exercise, the dialogue shifted to a fundamental question about transformation. They asked the following questions:

> If the purpose of transformation is to make the battlefield transparent, then to whom is it transparent—the soldier, sailor, or airman or the general and the admiral; those on the front lines, or those in high command?
>
> If transformation allows for the execution of forces in concert, then who makes the decision to execute—the soldier, sailor, or airman at the end of the spear, or the general and the admiral in high command?
>
> Is the grand vision that of a biological-or-network-like system with independent units having great visibility of and control over their local environments, or are we destined for a hierarchical system where both knowledge and direction flow from the top and execution comes at the other end of the chain?
>
> Are we going to produce a warrior culture similar to the one depicted in Robert Heinlein's *Starship Troopers*, or are we building the bridge of the *Enterprise* for a future Capt James T. Kirk?

One member observed that it would be ironic to have this century-long struggle—throughout which the Air Force has consistently advocated centralized control and decentralized execution—reach an end-state doctrine where air assets are centrally controlled *and* centrally executed. Such an outcome would be the cultural antithesis of the victor, TAC, and the essence of the vanquished "mother" SAC and "Big" MAC.

Nevertheless, leaders such as these—the well-prepared members of the Air War College class of 2003—will determine that path. All of us who had the opportunity to work with them have been impressed and hope that you, the reader, have found it useful to review their ideas, as contained in this abbreviated recounting. Your comments are invited, and your presence at the Air War College as a visitor, student, or member of the faculty is welcome. □

Notes

1. All of the members of the seminar are listed as authors because all members contributed to the discussion. This does not, however, imply that each of the members agrees with every word written, or even any word written. The professors take responsibility (but not credit) for capturing the concepts as they flowed and for organizing, amplifying, and presenting them here. We also benefited from the editorial skills and intellectual contributions in matters of airpower doctrine and theory from our colleague Dr. Mark Conversino. Although new to the AWC and Warfighting faculty, he serves as its deputy chair and was previously a member of the faculty of the School of Advanced Air and Space Studies.

2. The theoretical models we use and the historical examples we provide are necessarily abbreviated. In a more expansive treatment, we would certainly have included Julian Corbett alongside Mahan as a competing interpretation on the demands for sea power, and Alexander de Seversky, William Mitchell, Hugh Trenchard, and Curtis E. Lemay with Douhet on airpower discussions. Likewise, Nicholas Spykman's ideas would be added to those of Mackinder for a more complete understanding of continental theories. Similarly, we gloss over complex bureaucratic behavior, making only casual reference to complex organizational activities and with no reference at all to the theories of Graham Allison, Herbert Simon, or Aaron Wildavsky. Although these more elaborate considerations are parts of the courses taught by the AWC Departments of Strategy and International Security and Leaderships and Ethics, our purpose was to look at a variety of topics addressed by our seminar during the Warfighting course. We recognize and pay tribute, therefore, to materials addressed in other

courses, but put forth only that amount needed to generate a (hopefully) coherent article. Although we did not have room either to expand on all the fascinating and important excursions or address the many varying interpretations of these theories, we hope you appreciate this limitation and use it as a springboard for further discussion, reading, and deeper thought.

3. Mackinder developed the idea of a "heartland," the area between Eastern Europe and Siberia, and the control of which would determine the future of Europe. That area contained many of the raw materials necessary for industrialization—hence its strategic importance.

4. The term "superior," when it is attached to airpower theory, is bothersome to some. Consider an analogy from physics. There are two fundamental, and contradictory, theories of physics. Newtonian physics, sometimes called "big physics," is based on the assumption that mass and energy cannot be exchanged, and the major force of attraction is gravity. Quantum physics, "little physics," is based on the assumption that mass and gravity can indeed be exchanged ($E=MC^2$), and the major force of attraction is magnetism. Although physicists search for a unifying theory, these two theories cannot be merged because of their contradictory assumptions. Still, both theories are useful. If you are going to build a bridge or go to the moon, big physics provides the superior theory and is your best tool. If you are going to build a nuclear power plant or a nuclear weapon, then the quantum theory of little physics is the superior theory. Nevertheless, physicists continue their search for what they would really like to have—an integrative theory that applies in all circumstances. Such is the situation with our use of the term "superior" as it applies to airpower theory.

The questions before our seminar were as follows: Is airpower a superior theory for the circumstances as they now exist (especially in the United States)? Is it a superior theory in the integrative sense? Is it neither? This article argues that airpower is a superior theory for the specific case of the United States at this point in time because it exploits our comparative advantage in technology and compensates for our geographically removed position from the most likely trouble spots. We also argue that airpower theory is a superior theory as a general theory because airpower facilitates force integration and transformation. These arguments do not imply that the Air Force is a superior branch of the armed forces—such conclusions would be incorrect and inappropriate, and are certainly not implied by this article.

5. The Warfighting course examines two questions. The first asks how to fight the nation's future wars; the second asks whether we have the right forces with which to fight those wars. The first question focuses on the combatant commanders; the second on the individual services. They are both good questions. After all, you cannot fight with what you do not have, and you fight much better if you are well prepared. The discussions captured in this article are not divided along the lines of these questions because in seminar, and indeed in practice, the two questions are inseparable.

6. The Air War College experience is based on academic freedom, augmented by a policy of nonattribution. In layman's terms, this means you can express your views freely, but your views cannot be attributed to you directly. It is permissible to reflect, in general terms, on what was discussed, but it is not proper to indicate who said it. Although it might have been useful—even welcomed by members of the seminar—to pepper this article with participants' names, it would have been against those rules.

7. "Marginalized" does not mean irrelevant. Fighters were assigned to defend North American airspace, but air defense can be considered part of the strategic equation. The Air Force did incorporate nuclear weapons into the fighter force to some degree, and the F-84, F-100, F-101, F-104, F-105, F-106, and F-4 forces did pull nuclear alert, but by far the bulk of America's nuclear forces were bomber-carried weapons; all were incorporated into the Single Integrated Operational Plan (SIOP). Traditional fighter missions—defensive counterair (DCA), air interdiction (AI), offensive counterair (OCA), and close air support (CAS)—were simply not the mainstay of the 1950s Air Force.

8. Members of the seminar were quick to point out that both the Army and Navy had suffered, and may still suffer, from the same sorts of internal battles. For the Army, the heavy-versus-light debate has dominated force-structure debates for years and is playing out as high drama with the current secretary of defense's (SECDEF) concept of transformation. We recalled that in the mid '80s the Navy staff was ruled by three-star warfare czars (surface, air, submarine). The chief of naval operations created the position of deputy chief of naval operations (resources, requirements, and assessments), whose first director was Rear Adm Bill Owens, to direct resource allocation and then downgraded the three-star billets to two stars. Admiral Owens introduced a "strategic radiator" matrix to evaluate the Navy's investment balance across warfare missions. That matrix was nearly identical to what would eventually be called the "cosmic radiator" with the rows and columns representing the services and warfare areas in the joint war-fighting capabilities assessment (JWCA). That matrix was introduced while he was the vice chairman of the Joint Chiefs of Staff and responsible for the reorganization and restructuring of the armed forces in the post–Cold War era.

9. Our general reference here is to the military leaders James Kitfield describes in his book *The Prodigal Soldiers* (1995; reprint, Washington, D.C.: Brassey's, 1997). It is excellent, on the *CSAF's Reading List*, and one you should read—if you haven't already done so.

10. Our seminar quickly noted that if space were an AOR and if the commander of US Space Command (USSPACECOM) had resources, then he was essentially a service chief. We suspected the service chiefs did not miss this point when they decided not to make space an AOR. We did note, however, that SECDEF recently established a new four-star billet for space resources.

11. The lack of any real air force and the posture of the Iraqi force at the onset of the war made it relatively easy for the US Air Force and US ground forces to achieve victory during DS/S. During DS/S Iraqi tanks and troops were exposed. During OIF Saddam attempted to do better by emplacing heavy forces in and around highly populated cities, making targeting difficult for US forces.

12. Christopher J. Bowie et al., *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns* (Santa Monica, Calif.: RAND, 1993). David A. Ochmanek was a major contributor to this book, and our seminar found resonance in its reasoning that the end of the Cold War brought with it a new calculus for the use of force. The Cold War model was predicated on a movement into major war along the central front, with ground forces being first to engage, and alliance air forces being tasked for DCA, AI, OCA, and CAS as NATO wrestled with trading space for time to delay reaching the nuclear threshold. Naval forces focused on delivering troops and equipment for long-term reinforcement, and airlift partially filled the gap as US Army forces fell in on their pre-positioned materiel sites. Thoughts of offense were bounded by the political realities of NATO and the imbalance of conventional forces with the Warsaw Pact. Ochmanek argued for a new calculus: a conflict that will begin at a future unknown location where US ground forces will not be present, or at least not in large numbers. Naval forces might be available, but it would be air forces—not necessarily the US Air Force, but air forces—that would be first to engage. Next, naval and marine forces would be inserted into the conflict, which would be followed by the Army. In this new calculus, airpower took on special importance. Ochmanek also established the primacy of precision-guided munitions—a conclusion that, to our seminar, was more obvious and less important than the argument on airpower.

13. *Jointness* and the influence of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 permeated our discussions throughout the semester. Our seminar was united in the belief that no matter how energetic and charismatic a leadership team might be, you don't really change an institution unless you in-

stitutionalize the change. Without Goldwater-Nichols, most of us doubted that the United States could have achieved the successes of either gulf war, and many of us doubted if we would have made much progress at all to solve the problems we had already discussed with respect to Vietnam, and that also existed in Desert One, Lebanon, and Grenada. Although our discussions on Goldwater-Nichols could easily fill another article, one dialogue—the struggle for jointness in procurement—is worth mentioning here. That discussion involves the Joint Requirements Oversight Council (JROC) and Adm Bill Owens. When Admiral Owens became the vice chairman, he tackled the problem of how to increase the joint emphasis on resource allocation (procurement)—an arena that was jealously guarded by the service chiefs. In a bold step, Admiral Owens reinvigorated the JROC to gain control of the requirements process—establishing the requirement was the first step in, and the justification for, resource allocation—in that way the JROC would institutionalize a joint influence on procurement. As we peeled away the layers of this "onion," we found no instance where the JROC had said "no" to a service-supported major weapon system. We also observed that Admiral Owens's successor created a Joint Requirements Oversight Council Review Board (JRB) that was subordinate to the JROC, whose membership was made up of the four-star service vice chiefs. The JRB was comprised of general officers at the two-star level and had the effect of dampening the joint effort to influence procurement. We had some real doubt with respect to the effectiveness of joint influence on service procurement and even broached the idea of modifying the current program objective memorandum (POM) budgeting process to include, or be replaced by, a chairman's and/or unified commander's POMs (analogous to SOCOM). Our conclusion—not unanimous by any means—was that Goldwater-Nichols had influenced military operations to a considerable degree, but that its influence over the procurement process was far less obvious.

14. The CAOC idea has experienced a myriad of false starts as lessons were seemingly observed and learned but not internalized. The second experience of American forces at Kasserine Pass in 1943 demonstrated the effectiveness of campaign-level coordination of air and ground power. The net effect of this massed and concentrated firepower allowed a previously routed force to attack and destroy Rommel's advancing armored force before it reached its prepared defensive position at the Mareth Line. Unfortunately, this lesson was not internalized, and the relationship between air and ground forces in Vietnam could best be described as dysfunctional. The origin of the CAOC concept—in Africa, Europe, the Pacific under George Kenney, or even at sea under William Halsey—is an interesting question. However, the important point is that the CAOCs of the two gulf wars, and the operations in between, have been very effective in using technology to establish organizational structure and direct combat assets to satisfy the combatant commander's needs.

15. DOD, *Transformation Planning Guidance*, April 2003, online, Internet, 23 September 2003, available from http://www.oft.osd.mil/library/library_files/document_129_Transformation_Planning_Guidance_April_2003_1.pdf. The SECDEF's guidance asks "what is transformation" and then goes on to explain: "Transformation is a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world." While interesting, this definition lacks specificity and cannot be used to differentiate between competing ideas and systems. In a February 2002 Pentagon briefing, Vice Adm Authur Cebrowski, head of DOD's Office of Force Transformation, noted that

> the challenges of a new century are not nearly as predictable as they were during the Cold War. . . . And let there be no doubt, in the years ahead, it is likely that we will be surprised again by new adversaries who may also strike in unexpected ways . . . and let there be no doubt . . . these attacks will grow vastly more deadly than those we suffered several months ago. . . . Our challenge in this new century is a difficult one. It's really to prepare to defend our nation against the unknown, the uncertain and what we have to understand will be the unexpected. . . . *This is precisely what transformation is about* [emphasis added]. Here we are in the year 2002, fighting the first war of the 21st century, and the horse cavalry was back and . . . being used in previously unimaginable ways. It showed that a revolution in military affairs is about more than building new high tech weapons . . . . It's also about new ways of thinking, and new ways of fighting.

Deputy Secretary of Defense Paul D. Wolfowitz added to the definition by testifying that "transformation is about more than technology; it is about innovative concepts of operating and configuring our forces, adjustments in how we train and base our people and materiel, and how we conduct business day to day. The goal of transformation is to maintain a substantial advantage over any potential adversaries in key areas such as information warfare, power projection, space and intelligence." Senate, *Testimony of Deputy Secretary of Defense Paul Wolfowitz, Prepared for the Senate Armed Services Committee on Transformation, April 9, 2002*, 107th Cong., 2d sess., 2002, on-line, Internet, 23 September 2003, available from http://www.senate.gov/~armed_services/statemnt/2002/April/Wolfowitz.pdf.

Although all these definitions were interesting, they did not provide a means of gradation and were not very helpful in differentiating between alternatives. We continued to seek a more useable definition.

16. Inside the Pentagon, according to one of our seminar members, a senior civilian stood up in a meeting, holding an envelope to his forehead in an imitation of Johnny Carson's Karnack and posed the Jeopardy-like question "B-1, B-2, B-52?" After a moment, he is said to have torn the envelope open and pronounced the answer: "Two bingo numbers and an operational bomber."

17. The Air Force sought standardization in terms of organizational structure, hardware, software and process, and in an identified core of experts who would populate the cells. This effort toward standardization led the Air Force chief of staff to refer to the AOC as a "weapons system," meaning that from a personnel and procurement point of view, the Air Force should treat it in a manner similar to other weapons systems.

18. Our seminar was concerned that training and effectiveness would atrophy if commanders only manned the AOC with aviators whose current duty status did not include flying (DNIF) or with the otherwise unemployed unit members.

19. Charles J. Dunlap, "The End of Innocence: Rethinking Noncombatancy in the Post-Kosovo Era," *Strategic Review* 28, no. 3 (summer 2000), addresses this directly and is the source of our thoughts and conclusions. The article is worth your time to read.

20. Seminar Six was an exceptional group of 15 students, of whom three were international officers and one was a civilian. Four were promoted to colonel during their year in residence. Six were selected for command in their assignments following Air War College. Four graduated with distinction, and the seminar earned the highest overall grade point average during the 2003 academic year.

21. These responses also applauded Air Force efforts on "smart tankers," a system that in the near term will use a tanker airframe to relay real-time situational awareness data between fighter and joint surveillance, target attack radar system (JSTARS) aircraft and ground operations centers—enhancing battlefield information superiority. As originally envisioned, this system might eventually function as an intelligence, surveillance, and reconnaissance (ISR) platform—leveraging HD/LD assets and transformation capabilities even further. This synergy between AF systems is cost-efficient, and our respondents thought it was also a highly desirable way to support transformation.

“Hap” Arnold

CHARLES TUSTIN KAMPS

Gen Henry H. “Hap” Arnold is an icon rising above all others in the development of American airpower. Although in his 42-year career he never took part in aerial combat himself, Arnold presided over the expansion of the US Army Air Forces (USAAF) from an underequipped, second-rate organization to the largest and most powerful air arm in the world.

Born in 1886 in Pennsylvania, Arnold graduated from West Point in 1907 as an infantry officer. He acquired the nickname “Hap” (for “happy”) from his contemporaries because he always looked like he was smiling. Arnold managed a transfer to the aeronautical division of the Signal Corps in 1911 and learned to fly at the Wright brothers’ training school in Dayton, Ohio. After a promising start in the aviation community, several accidents shook his confidence, and Arnold “bailed out”—not flying again until 1916.

World War I was frustrating for Arnold, who was stuck behind a desk in Washington, D.C., as a staff officer. After the war, he embraced Billy Mitchell’s advocacy of airpower and collected several trophies for flying accomplishments along the way. Also during the thirties, he led a flight of B-10s to Alaska and back in a demonstration of the feasibility of long-range bombing; additionally, he presided over the western zone of the government’s abortive airmail scheme.

By 1938, as a major general, Arnold was appointed chief of the Army Air Corps. With the approach of World War II, he worked tirelessly to build up a pilot-training establishment and encourage the mobilization of industry to produce needed aircraft. A week after Pearl Harbor, Arnold was promoted to lieutenant general and became part of the higher direction of the war effort when, in March of 1942, he was appointed commanding general of USAAF.

During World War II, he pushed his staff and subordinates to give every ounce of effort, often personally corresponding with and visiting agencies and commands. In March of 1943, Arnold became a full general, but the strain began to take its toll. He soon suffered the first of six heart attacks but, characteristically, bounced back in short order.

By 1944 Arnold was already laying the groundwork for an independent air arm after the war. He formed Twentieth Air Force, subordinate directly to him, as the organization for B-29s in the air campaign against Japan. He also identified the Soviet Union as the greatest postwar threat to the United States. At the end of 1944, Arnold received his fifth star as a general of the Army (later changed to general of the Air Force).

The rigors of command had taxed Arnold heavily, and literally days after Japan surrendered, he announced his impending retirement, which took effect on 30 June 1946. Arnold died in 1950 at the age of 63, having lived to see the creation of the United States Air Force, equipped with jets and atom bombs, less than 10 years after he had taken command of a struggling, underfunded branch of the Army.

To Learn More . . .

Arnold, Henry H. *Global Mission*. New York: Harper and Row, 1949.Ä
Daso, Dik Alan. *Hap Arnold and the Evolution of American Airpower*. Washington, D.C.: Smithsonian Institution Press, 2000.Ä
Huston, John W., ed. *American Airpower Comes of Age: General Henry H. “Hap” Arnold’s World War II Diaries*. 2 vols. MaxwellÄ AFB, Ala.: Air University Press, 2002.

Editorial Abstract: Is the United States ready to deal with an opponent who employs asymmetric strategies in an attempt to wage a "poor man's air war"? This case study of the Luftwaffe's efforts to cope with the loss of daylight air superiority in 1944–45 shows how a military organization, faced with the neutralization of most of its weaponry and the increasing irrelevance of its doctrine, may attempt to prolong its useful life. The ability to inflict unexpected casualties on the US Air Force, its coalition partners, or friendly populations might pay disproportionate dividends to a future adversary.

Losing Air Superiority

A Case Study from the Second World War

DR. RICHARD R. MULLER

WHAT HAPPENS WHEN an airÄ force loses the ability to gain andÄ maintain air superiority? HowÄ might an energetic and resource≠Ä ful air force leadership deal with this situation?Ä As the United States prepares to face twenty-Ä first-century adversaries, it is extremely unlikelyÄ that it will encounter an air force able toÄ match the US Air Force in terms of technology,Ä training, numbers, and combat power. How-Ä ever, the United States may well have to dealÄ with opponents who employ asymmetric strategies in an attempt to wage a "poor man's air war."

A study of the Luftwaffe's efforts to cope with the loss of daylight air superiority in 1944–45 is of more than historical interest. It serves as a case study of how a military orga≠ nization, faced with neutralization of most of its weaponry and the increasing irrelevance of its doctrine, may attempt to prolong its useful life. Since the United States may encounter

such an adversary in the future, an examination of how a past foe coped with this state of affairs may enlighten contemporary air and space planners.

The Loss of Air Superiority over the Homeland

When the Anglo-American bomber offensive began seriously to threaten Germany's control of its airspace, the Luftwaffe leadership responded energetically. Gen Günther Korten, chief of the Luftwaffe General Staff, set to the task of creating "an umbrella of fighter aircraft over the Reich." Korten belonged to a "defensive clique" that included Col Adolf Galland—the inspector general of fighters—and Field Marshal Erhard Milch—the chief of air armament. Korten beefed up the homeland air-defense organization, finally creating Air Fleet Reich—equivalent to a numbered air force—which centralized all flak, fighter, and command-and-control functions. At the same time, and in keeping with basic Luftwaffe doctrine, Korten's reforms also called for strong bomber forces in both the eastern and western theaters in order to permit the Luftwaffe to carry out strategic operations.[1] Even so, Korten's program brought about an increase in the strength and efficacy of Germany's air defenses.

Korten's organizational reforms were matched by Milch in fighter production. In partnership with Albert Speer, the armaments minister, Milch minimized the inefficiency of the German aircraft industry. Through stringent measures, he was able to boost aircraft output without increasing consumption of raw materials.[2] By June 1943, German factories were producing over 1,100 fighters per month. In March 1944, Milch and Speer set up a joint "Fighter Staff" with far-reaching authority over production, plant dispersal, construction of bombproof factories, raw material, and labor matters. German aircraft production finally peaked in September 1944 at just over 3,700, despite months of Allied air attacks.[3] The production reflects the underlying tension between the need to strengthen the homedefense forces and the desire to retain an offensive capability. Thus, the Germans also manufactured thousands of bombers (whose production consumed far more raw materials and factory floor space than did fighter aircraft) in 1943–44.[4] The quest for offensive power did its part to make the loss of air superiority permanent.

The Luftwaffe's operational response to the crisis was no less energetic. It placed great hopes in its basic interceptors, the Messerschmitt (Me) Bf 109G and Focke-Wulf Fw 190A. These aircraft initially lacked the necessary armament to deal with American heavy bombers, so later variants carried 13 mm machine guns and 30 mm cannons in place of the earlier 7.9 mm and 20 mm weaponry. Both types could also carry 21 cm rocket mortars to break up enemy bomber formations from well outside the radius of their defensive firepower. The German fighters would then pick off the stragglers at will.

Yet, these modifications also hastened the loss of air superiority once American long-range escort fighters appeared on the scene. The heavily laden 109s and 190s were severely handicapped in combat with their less encumbered American adversaries—a problem the Luftwaffe command never solved. One attempted remedy involved the development of specially stripped fighter aircraft with superior high-altitude performance and air-to-air capability. These included Bf 109G and K fighters with special superchargers and methanol and nitrous oxide injection, as well as the "long-nosed" Fw 190D and Ta 152. These vastly improved interceptors appeared only in small numbers; coordinating the "light" and "heavy" aircraft proved extremely difficult—and tactically ineffective—in practice.

Another proposal that has attracted postwar attention was Galland's suggestion to mass some 2,000–3,000 German fighters for a knockout blow. His goal was to commit this force against an American bomber formation in order to "shoot down an approximate total of 400–500 four-engined bombers against a loss of about 400 aircraft and about 100–150 pilots."[5] A victory on this scale would cause

the Americans to cease daylight penetrations, restoring air superiority at a single stroke. In Galland's view, Hitler scuttled this potentially decisive action by earmarking his carefully husbanded fighter reserve for support of the Ardennes counteroffensive in December 1944.

One has reasons to doubt the potential effectiveness of the "Great Blow." While the operation was in the planning stages, considerable portions of the fighter reserve engaged American formations, but even under favorable conditions, the Germans did not down a significant number of American aircraft.[6] The standards of German fighter-pilot training were so low by fall 1944 that the bulk of the 2,000+ pilots participating in the proposed operation would have been incapable of operating effectively. In particular, the task of assembling and controlling such a large quantity of aircraft in a single operation was probably beyond the Luftwaffe's capability in late 1944.

With conventional German tactics proving increasingly futile, desperate expedients arose. In summer 1944, the Luftwaffe command created the "assault fighter groups." Modified Fw 190s, with increased armor plating and packing heavy armament, formed into "flying wedges" of 48 aircraft. The massed juggernaut, heavily escorted by conventional fighters, would approach a B-17 combat box from directly astern. The rationale was simple: to ensure the greatest possible number of kills, shatter enemy morale, and disrupt formation discipline. As one Sturmgruppe pilot recalled, "We positioned ourselves about 100 yards behind the bombers before opening fire. From such a range we could hardly miss, and as the 3 cm explosive rounds struck home we could see the enemy bombers literally falling apart in front of us."[7] If all else failed, the Sturmgruppe pilot was to ram his target. According to official Luftwaffe High Command instructions, "the guiding principle for the Sturmgruppe is: for every assault fighter that encounters the enemy, a sure kill."[8] These special units achieved some noteworthy successes, but the overall cost was high—especially when the American fighter escort caught the formation while it was still assembling.

The German technological cure that has received the greatest amount of postwar scrutiny was the development of turbojet and rocket-propelled interceptors. Because airpower and air superiority have increasingly depended upon technology since 1945, it is hardly surprising that studying the German "wonder weapons" has become something of a growth industry. Many authorities single out mismanagement of these weapons as one of the cardinal reasons for the Luftwaffe's defeat. Certainly, the Me 262, with its top speed of 540 mph and powerful armament of four 3 cm cannons (and eventually racks of air-to-air rockets), was an awesome weapon. Galland, echoed by many other writers, attributes this aircraft's delayed debut to Hitler's untutored meddling in air force matters. The führer, so the argument runs, decreed that the Me 262 enter service as a high-speed bomber; this decision ensured that it did not reach operational units in time to turn the tide.[9]

The idea of the Me 262 as the potentially decisive wonder weapon is one of the most enduring myths in airpower history. Hitler's oft-quoted order forbidding the employment of this aircraft as a fighter dates from May 1944, by which time no Me 262s were in service. Because design and technical faults still plagued the aircraft, its employment in any role would have to await their resolution—as would the training of a sufficient number of pilots, many of whom found it difficult to master the temperamental interceptor. It is unlikely that the jet could have appeared in combat much earlier than it did, even without Hitler's interference. The 262, although a deadly aircraft in the hands of the right pilot, remained essentially a prototype pressed into combat service. Throughout its short service life, the aircraft suffered from an abnormally high accident rate and scored only a minuscule number of combat victories.

German industry produced a number of less significant advanced-weapons projects in the last year of the war. Although these caused

Allied intelligence some concern, none had any discernible impact upon the battle for air superiority. During the years of victory in 1939–41, German aircraft industry failed to energetically press the development of successors to the basic types with which Germany began the war. A more rational production strategy might have relieved the Luftwaffe of the dilemma of having to go into battle in 1944 with either obsolete types or unready new ones.

A sure sign of the fighters' slumping effectiveness was the resurgence of antiaircraft (flak) forces as the main element of home air defense. German antiaircraft concentrations around key targets grew dramatically. The backbone of the force was the 8.8 cm flak 36; by 1944 improved 10.5 cm and 12.8 cm guns had appeared. Although the flak force was actually more effective than many postwar analyses would lead us to believe, the failure of the fighter defenses led to increased—and by 1945, virtually sole—reliance upon it.[10] Prior to January 1944, fighters claimed the lion's share of downed US Army Air Forces (AAF) bombers, but in June 1944 alone, flak downed 201 Eighth Air Force heavies—fighters only 80.[11] Instructions to flak units stressed that they were to "free fire" at all altitudes, without regard for friendly fighters in the area.[12] The prewar tenet of German airpower doctrine that gave antiaircraft guns the dominant air-defense role had been fulfilled by default.

Even though German ingenuity was able to provide the Luftwaffe with large numbers of aircraft, it offered no solution to the problem of producing sufficiently qualified pilots to fly them. The Luftwaffe in 1939 had what was probably the highest standard of aircrew training in Europe.[13] As a result, German fighter pilots, seasoned by combat in Spain in 1936–39, were the best in the world by 1940. Yet, as early as the Battle of Britain, increased crew losses brought with them a decline in the length and rigor of the training program. The instructor cadres of the flying schools were constantly raided for combat pilots. By July 1944, when the general fuel crisis hit home, Luftwaffe fighter-pilot trainees were receiving fewer than 25 flying hours in operational fighter aircraft, compared with over 150 hours for American pilots.[14] Quite simply, the average German fighter pilot in mid-1944 was more a liability than an asset, all too prone to crash his aircraft on the first sortie. Specialized skills such as night or bad-weather flying and long-distance navigation were lost arts in the Luftwaffe by that time. In an effort to redress the balance, the Luftwaffe command made a number of grave personnel-policy decisions. The overstretched pilot-training schools were compelled to give up additional instructors, and every able-bodied fighter pilot serving on staff duty was recalled to combat flying. Galland pillaged night-fighter units, ground-attack formations, and the Russian front for trained pilots.[15] The course of the air war over the Reich placed tremendous strains on an already overtaxed organization.

In April and May 1944, the operations staff noted an alarming rise in losses of training, courier, and transport aircraft operating in previously safe havens in eastern and southern Germany.[16] Allied fighter aircraft ranging at will over Reich territory curtailed the Luftwaffe's ability to train new pilots to replace losses of the previous months. Many gun-camera films from AAF Mustangs and Thunderbolts illustrate attacks on aircraft, frequently misidentified as "Me-109s," that are in fact Arado 96 trainers—usually with a dazed student pilot at the controls. In order to cope with this situation, the Training Branch issued new instructions emphasizing vigilance ("daydreaming leads to death"). Noncombat flights were to take place only at dawn and dusk. The Luftwaffe expanded its aircraft-warning system and devised a series of radio and visual signals. Even courier aircraft were armed. If attacked, aircraft were to take evasive action and dive quickly to ground level. If necessary, the crew was to belly-land the aircraft and take cover to avoid being strafed.[17]

The commencement of "aerial guerrilla warfare" by AAF escort fighters meant that not only the training facilities, but also the whole of the Luftwaffe's supporting infrastructure was at risk. American escort fighters, at first

individually but later as a concerted policy, began strafing airfields and ground installations on their homeward flights.[18] The Luftwaffe airfield commands adopted a number of passive measures, including constructing revetments, increasing the use of optical camouflage and smoke screens, and burying vital communications and electrical cables that served command posts and radar installations.[19] Deep slit trenches appeared on airfields, with fuel and ammunition stored in tunnels. Posting of additional lookouts and a reorganization of the aircraft-reporting service provided crucial early warning.[20] In the final month of the war, some units operated off stretches of the autobahn, sheltering their aircraft beneath the overpasses.

The single most effective countermeasure the Luftwaffe took was the equipping of airfields with additional antiaircraft protection. Luftwaffe operational directives pointed out that the concentrated firing of every available weapon—even machine guns and cannons removed from parked aircraft—could turn the airfield into a veritable "flak trap" for low-flying aircraft. The Luftwaffe operations staff noted with satisfaction the depositions of captured AAF pilots who spoke of the dangers of strafing.[21] Indeed, during 1944 the AAF lost 1,293 fighters in the European theater of operations to enemy fighters, while losing 1,611 to flak—mostly in low-level actions.[22] During the last five months of the war, German flak kills of AAF fighters exceeded those made by Luftwaffe fighters by a ratio of nearly four to one.

One final remedy for the air-superiority dilemma deserves mention: the employment of volunteer pilots on suicide missions. The popular literature is filled with Wagnerian references to 11th-hour attempts to emulate Japanese kamikaze tactics. Although the reality is somewhat less dramatic (in only a very few instances did such attacks take place), they remain of interest: such expedients rarely occur on an organized basis in interstate warfare, but nonstate actors such as terrorist groups have not shrunk from employing them.

The desperate military situation in 1944–45 partially accounts for the contemplation of these extraordinary efforts. As historian Omer Bartov has noted in his study of combat motivation on the Eastern Front, the military reverses of the latter years of the war, coupled with intensified Nazi indoctrination, generated a new level of fanaticism among German soldiers.[23] Official Luftwaffe publications, including military-science journals and even operational directives, which had been largely devoid of overt political content up to 1944, began referring to the struggle in ideological terms. Directives maintained that only "the National Socialist world-view" could provide the necessary "internal strength" to vanquish the enemy.[24] The primary sources for such "spiritual weapons" were the National Socialist Leadership Corps, which populated Luftwaffe and army units with "political officers" (akin to Red Army commissars) and the Military Science Branch of the Luftwaffe General Staff. Although the latter agency produced much valuable operational analysis and traditional historical studies of recent campaigns, by 1944 it was more concerned with inculcating the Luftwaffe officer corps with proper National Socialist attitudes.[25] In this ideologically charged climate, the most extreme measures for redressing Allied air superiority took shape.

Luftwaffe programs along these lines fell into two broad categories. The first consisted of extremely high-risk (but theoretically survivable) missions against enemy air and ground targets. Sturmgruppe tactics fall into this category, since even ramming attacks did not prevent pilots from bailing out. Even more desperate was the proposal to quickly train Hitler Youth boys on gliders and send them immediately into combat in the Heinkel 162 "people's fighter"—an aerial manifestation of the Volkssturm, the "people's militia," with which Germany hoped to create a Nazi "levee en masse."[26] Only the end of the war spared teenagers from flying the unreliable and dangerous aircraft in combat.

The second (and much rarer) category was so-called total-commitment missions, billed explicitly as suicide operations. With the air

battles over the Reich seen as the greatest threat to German national survival, a number of proposals surfaced in late 1944 for using volunteer pilots for suicide attacks against American bomber formations or other lucrative targets. Korten ordered the formation of the Leonidas Squadron, which would operate aging bombers, attack gliders, and manned flying bombs in this manner. The unit ultimately disbanded after extensive training and political indoctrination.[27] Yet, proposals and programs for ramming attacks against bomber formations continued throughout the war, culminating in a desperate mass ramming attack by the hastily formed Schulungslehrgang Elbe unit on 7 April 1945. One hundred twenty Bf-109s engaged an AAF formation, destroying at most 13 bombers at a cost of 53 German fighters. Many of the poorly trained pilots never even engaged the AAF formation.[28]

Despite the expenditure of blood and treasure, the Luftwaffe was never able to regain air superiority over the Reich. Despite signs of an 11th-hour technological "knockout blow," the Luftwaffe of 1944–45 was an ineffective force, incapable of controlling the tempo of operations or even of causing the AAF more than occasional inconvenience. Most of its pilots from June 1944 onwards were more a hazard to themselves than to their enemies, and its overstretched flying units operated obsolete, poorly constructed aircraft. During the final year of the war in Europe, German day fighters destroyed 703 AAF heavy bombers; from June 1943 to May 1944, a much smaller force had destroyed 1,579.[29] All of the energetic measures put into place by the Luftwaffe command to combat the daylight bombing offensive had failed.

Coping with Allied Air Superiority: The Combat Fronts

Despite the fearful losses sustained by its fighter units in the early months of 1944, the Luftwaffe command believed that it could mount a successful aerial response to the coming Allied invasion of Western Europe: "Defense against this landing attempt is decisive for the outcome of the war."[30] The Luftwaffe developed a complex scheme for reinforcing the invasion sector once the Allies launched Operation Overlord. Upon receipt of the code phrase *Drohende Gefahr West* (Imminent Danger West), squadrons from the Reich defense force were to fly to previously identified airfields in northern France. As many fighter aircraft as possible were to be equipped with bomb racks so that they could participate directly in the ground battle.

The Luftwaffe took note of the experience gained during the months preceding the invasion in preparing for battle. Units in France in early 1944 reported increasing enemy fighter and fighter-bomber attacks—augmented by medium- and heavy-bomber strikes—against airfields, transportation centers, rail communications, and radar and signals installations.[31] The ground organization learned sophisticated techniques of camouflage, concealment, dispersal, and mobility as means of reducing losses of materiel and personnel to air attack. Drawing on its experiences on German territory, the Luftwaffe deployed mobile flak batteries, especially the quadruple 2 cm antiaircraft gun. This useful weapon, often mounted on a trailer, truck, half-track, or even a tank chassis, provided dense and highly mobile fire support for important targets, including airfields, bridges, and trains.[32] For protection of ground units, the Germans concentrated their flak batteries in the front and rear of the columns, with weapons at the ready. German commanders designed quick and responsive aircraft-alert procedures, and when an enemy aircraft was sighted, the column would stop, and the antiaircraft vehicles would deploy to the sides of the road, providing massed antiaircraft fire against low-flying Allied "Jabos."

The effect of Allied air superiority was far worse than even the most pessimistic Luftwaffe planners had envisioned. A Luftwaffe officer reported that enemy air activity rendered all daytime convoy traffic impossible, with the exception of fully armored units.[33] Landline communication throughout the invasion zone was disrupted from D-day onward, due to

both air attack and the activities of the French resistance. The Germans responded by making increased use of radio communications although, dependent as they were on the Enigma cipher machine, such measures made German intentions all the more transparent to Allied intelligence. Allied air superiority rendered the orderly transfer of Luftwaffe units into the theater an extremely difficult proposition.

The Luftwaffe's immediate response to the landings was "barely perceptible."[34] Indeed, the German air effort during the first 24 hours added up to only 319 sorties, thus dashing the initial hope of defeating the invasion during the first crucial hours.[35] Even so, the movement of Reich defense-fighter units had some success, with 200 aircraft arriving during the first 36 hours. By D-day plus seven, over 1,000 German aircraft directly opposed the landing.[36] As well as fending for themselves, they had to provide escort for the lumbering trimotor transports that hauled ground personnel and spare parts.[37] Real troubles for these aircraft began after their arrival since Allied air attacks had already damaged many of their airfields. The German fighter force was drawn into a losing battle to retain its operational ready-rates in the face of intense enemy air activity.

German commanders quickly realized that their methods for contesting Allied air superiority were not equal to the tasks facing them in Normandy. The ground organization had to deal with conditions far worse than even those in the Reich territory. As a result, the Luftwaffe High Command emphasized that "the flying forces and the ground organization are a single weapon" and sought to instill "warlike deportment" even among the second-line personnel who ran the airfields.[38] The Germans greatly strengthened their existing air-raid warning service since Allied fighter-bomber attacks often took place with little or no warning. Camouflage and dispersal almost became art forms, with aircraft uncovered immediately before a sortie and whisked under cover quickly after the propeller stopped turning. Antiaircraft forces came under an airfield-defense commander, responsible for training, implementing new defense measures, and actually conducting operations if the base came under attack. Flak commanders took advantage of the fact that Allied fighter-bombers pounced on everything that moved on the Norman roads by creating ingenious "low-flying-aircraft booby traps." They deployed mobile canvas dummies equipped with glass panels to simulate glare from vehicle windshields. When fighter-bombers dove to the attack, massed antiaircraft artillery (AAA) guns, usually camouflaged as shrubbery, opened fire.[39]

Early in the summer invasion, the Germans experimented with attempts to fly aircraft away from threatened airfields and disperse them to emergency strips. These "evacuation flights" soon ceased. For one thing, they tended to consume scarce stocks of aviation gasoline; for another, the airspace over Normandy proved far more dangerous than the ground. By early August 1944, the Luftwaffe had to withdraw its fighter force from the forward airfields since, as one commander recalled, his fighters were "pinned to the ground" by Allied aircraft.[40] The new bases—located to the southwest of Paris—though marginally less vulnerable to direct attack by Allied aircraft, compelled the Luftwaffe to fly greater distances, thus using precious fuel and decreasing loiter times. The hope of using fighters as "swing-role" ground-attack aircraft proved vain: bomb racks were quickly discarded as the fighters massed over selected German units to provide a modicum of air cover. They also attempted to shoot down Allied spotting aircraft, which registered the fire of conventional and naval artillery against the hard-pressed German ground forces.

Clearly, the fighter force could not make an appreciable impact, and the ground-attack arm found itself in an even more precarious position.[41] Bomb-laden Fw 190s were even less capable than their fighter counterparts of penetrating Allied fighter screens.[42] The Luftwaffe restricted its ground-attack missions to dawn and dusk—or bad weather. The Luftwaffe general staff concluded that "ground attack aircraft . . . no longer afforded any decisive

support to the land forces, and the heavy losses incurred rose ultimately to a level out of all proportion to the successes achieved."[43]

The Luftwaffe at least had few illusions that its bomber force, once its primary striking arm, would have a significant role to play in the daylight battles in Normandy.[44] Driven from even the night skies over western Europe, the Luftwaffe's offensive force depended increasingly on pilotless weapons—the Fieseler Fi 103 (V-1) "buzz bombs." As a substitute for conventional bombing capability, the V-1 had a number of shortcomings, especially its lack of precision. Yet, the robot bombardment, which began on 13 June 1944, tied down large numbers of Allied fighter aircraft and antiaircraft batteries that might have otherwise gone to Normandy. The Luftwaffe staff drew special attention to this collateral benefit in several of its tactical memoranda.[45] Later in the summer invasion, the army's A-4 (V-2) ballistic missile entered the fray. Although long touted by the Army Ordnance Rocket Program as a potential substitute for strategic bombing,[46] the V-2 featured even less accuracy than the V-1 and (since no defense was possible) did not cause any diversion of Allied fighter or antiaircraft forces.

Only in the area of reconnaissance support did Luftwaffe countermeasures produce any significant improvement. The Luftwaffe's inability to conduct even the most basic aerial reconnaissance rendered German forces virtually blind, a situation that went a long way towards ensuring the success of the Allies' preinvasion deception operation (Fortitude),[47] as well as granting Allied formations fighting in Normandy an unprecedented level of operational freedom.[48] Although Allied air superiority seemed to condemn the Luftwaffe reconnaissance force to the same irrelevance as most of its combat units, in this case radical new technology did bring about a noticeable improvement. Although the Me 262 jet-propelled interceptor did not appreciably alter the balance in the struggle for air superiority over Germany, its less celebrated counterpart—the Arado Ar 234 jet bomber/reconnaissance plane—dramatically improved the fortunes of the reconnaissance arm. In late July and early August 1944, two prototypes of the Ar 234 arrived at the invasion coast.[49] The Ar 234 was unarmed, carried two high-resolution panoramic cameras, and relied on its tremendous speed and altitude performance to escape interception.[50]

During a single flight on 2 August, an Ar 234 pilot flying the one operational aircraft "achieved what had been beyond the entire Luftwaffe reconnaissance force in the West for the previous eight weeks: he had photographed almost the entire Allied lodgment area in Normandy."[51] In fact, for the remainder of the war, reconnaissance units equipped with Ar 234s could operate virtually unmolested in the west, in Italy, and even over the British Isles. No longer did the German military possess the capacity to take effective action based upon the improved flow of intelligence information. Nevertheless, the operational career of the Ar 234 indicates the possibilities conferred upon even a hopelessly outclassed air force by single items of new technology.

Small successes aside, Luftwaffe countermeasures to Allied air superiority in Normandy did not appreciably prolong the struggle. Air support for German counteroffensives such as the Mortain attack in August was lacking, and the Luftwaffe ground organization was caught up in the general rout that followed in France. Wags in Germany remarked that the "WL" license-plate prefix on Luftwaffe vehicles in fact stood for "we're leaving!"[52] Luftwaffe tactical support for ground operations during the rest of the campaign remained spotty and ineffectual. Even the rare mass attacks by the Luftwaffe fighter force, as occurred in Operation Bodenplatte—the surprise attack on Allied air bases on New Year's Day 1945—were hardly worth the losses sustained.

The Luftwaffe's loss of air superiority on the Russian front, although neither as complete nor as dramatic as that in the west, still posed considerable problems. Although the Luftwaffe could concentrate its forces and wrest local air superiority from the Red Air Force, even into the final year of the war, it

still had to contend with the fact that it could muster only very limited or nonexistent air opposition over large sectors of the front. In these regions, the Germans resorted to many of the same camouflage, concealment, and antiaircraft techniques in place in the west, but a number of countermeasures were unique to the eastern theater. One of the most interesting and widely used of these "low-tech solutions" to the air-superiority problem was the use of aircraft in a night-harassing role. Since the early days of the eastern campaign, even when the Germans enjoyed general air superiority, frontline army units were vexed by the appearance of obsolete Soviet biplanes, operating at night and frequently flown by female pilots (the so-called Night Witches). Although the material effect of these attacks was minuscule, nightly fragmentation-bomb attacks eroded troop morale, caused sleep deprivation, occasionally destroyed supply depots, and inflicted casualties.

German air commanders drew inspiration from these developments. In the Luftwaffe's rear areas one found an assortment of obsolete training and reconnaissance aircraft, as well as many captured types. These aircraft had little role in major air operations, but—given the size of the theater and the dispersal of the Luftwaffe's fighter and bomber wings—most commanders adhered to the philosophy that "any unused aircraft is helping the enemy."[53] The Luftwaffe made extensive use of these antiquated aircraft, grouping them into night ground-attack units. Virtually undetectable by radar or other means, the aircraft attacked Soviet supply depots, partisan encampments, enemy airfields, and other vulnerable targets with light fragmentation bombs and machine-gun fire.[54] That these crude aircraft were able to operate so effectively should not be surprising; even 60 years later, under certain circumstances, light aircraft can penetrate even sophisticated air-defense systems. By fall 1944, over 500 such aircraft were operating, most of them in Russia; however, Allies also encountered night ground-attack units equipped with more modern aircraft types on the Italian and Western Fronts. As with many such improvisations throughout German military history, this cheap expedient came from the grass roots. Not until early 1944 did official published doctrine for the use of this weapon appear, and the bulk of developmental and experimental work with the concept occurred at the unit level. The fixation of the Luftwaffe Operations Staff on regaining conventional air superiority probably prevented more extensive reliance on such low-tech work-arounds.

Conclusion

By destroying the Luftwaffe and gaining air superiority over the whole of the battle area, airpower made its single greatest contribution to Allied victory in the Second World War. The German air force responded to this threat with resourcefulness and determination. Many of these measures brought transitory success; others had no detectable impact upon the course of events. One may assess their individual effectiveness on a number of levels. In creating a homeland-defense organization in the face of many demanding commitments on three widely separated combat fronts, the Luftwaffe High Command actually did a creditable job; in fact, by late 1943 it had come close to rendering the AAF's deep-penetration operations too costly to continue. The German aircraft industry certainly rose to the task of providing greatly increased numbers of fighter aircraft—so much so that the Luftwaffe to the end did not suffer from a shortage of airframes. Even under punishing bombing attacks, the armaments overlords of Nazi Germany accomplished a "production miracle." The success of these measures underscores the amount of resilience present in a modern state, even under the most adverse circumstances.

In spite of impressive technological developments such as the Me 262 interceptor, German high-tech solutions to the air-superiority problem were largely failures. As compelling as the vision of new technology countering Allied numerical superiority may have been, the late-war German developments could not

justify the exaggerated hopes placed in them. It is a fact that Luftwaffe airmen and ground personnel won their few defensive successes towards war's end with conventional or even obsolescent weapons.

What lessons does the Luftwaffe's struggle to regain air superiority suggest? Clearly, many aspects render the experience, from the vantage point of the early twenty-first century, only of historical interest. The pace of combat operations in the Second World War was rather leisurely and incremental. The Allied air offensive took years to unfold, only in the final year of the war doing real damage to the German economy. Even after the Normandy landings, the "broad front" strategy of the Western Allies enabled German forces—despite the drubbing they received in France—to reconstitute and not only defeat the Arnhem operation in September 1944, but also launch a major offensive in the Ardennes. Future conflicts are unlikely to afford an adversary such breathing space, during which the Germans implemented reforms in organization and aircraft production. Nor can a future adversary count on having time to ready new technology for even limited combat action. Furthermore, German countermeasures were designed to inflict decisive defeat upon the air forces of their enemies. As vain as that hope turned out to be, it is most unlikely that an adversary in the foreseeable future would even attempt to engage the US Air Force in such a battle for air superiority.

Despite the apparent gulf between the Luftwaffe experience and any future scenario, this historical case study offers relevant lessons. One of the more striking conclusions concerns the unwillingness of modern air forces to make sweeping changes in their operational doctrine. To suggest that the Luftwaffe's fixation on offensive operations was the sole—or even primary—cause of its defeat is to oversimplify the situation, but its adherence to cherished beliefs regarding the proper employment of airpower certainly delayed and hampered its response to the loss of air superiority. The costs of maintaining an offensive capability proved enormous, and for the Luftwaffe this was largely a self-inflicted wound.

Yet, to a certain extent, the Luftwaffe freed itself from the shackles of prewar doctrine, and its resulting measures hold the greatest interest to current airpower practitioners. Although the passive performance of the Iraqi air force in 1991 and 2003 in the face of coalition air dominance is reassuring, the Luftwaffe's experience—as well as the performance of the Argentine air arm during the Falklands war in 1982—suggests that well-trained air forces will continue to operate even in the face of overwhelming odds. Moreover, most of the significant, if transitory, German defensive successes resulted from clever and determined employment of conventional aircraft types, despite the postwar fixation on "wonder weapons." Ironically, the most relevant lesson from the Luftwaffe experience may be the use of obsolete, stealthy biplanes in a night-harassing role rather than the belated introduction of the world's fastest fighter. Recent US combat experience around the globe suggests many possibilities offered by the employment of less sophisticated weapons.

Reliance upon ground-based defenses also offers a great number of lessons. By mid-1944 the flak arm could claim responsibility for most of the Allied aircraft destroyed by German forces. Although the massing of heavy AAA tubes around important targets may seem a cost-ineffective way of doing business, the protection of tactical targets with massed small-caliber weapons was a different story. Since Allied aircraft immediately pounced upon every moving vehicle, it became a simple matter to lure them into well-concealed flak traps. Even humbler measures such as camouflage, concealment, smoke screens, shelter construction, and evacuations should not escape notice. Their cumulative effect enormously complicated the task of the Allied air planners. As Milch summed up, "If the last war taught us how to dig in, this war has taught us camouflage."[55] Inexpensive and requiring little training and preparation, such methods quickly lend themselves to the repertoire of any nation that faces air domi-

nance by an enemy. Moreover, concealment and mobility may prove an effective counter to precision-guided munitions, since these weapons often contain only a small warhead and depend on accuracy for their effectiveness. A future adversary would do well to study the German example.

In failing to halt the Allies, even the cleverest German countermeasures acquired an aura of total futility. The increased casualties inflicted by some of the measures were unlikely to divert the Allies from their stated goal of unconditional surrender. Yet, in a different political and social context, the capability of prolonging a conflict or driving up the casualty bill may be enough to force a major power to rethink its investment. As fruitless as the German measures were in a total war between nation-states, the ability to inflict unexpected casualties on the US Air Force, its coalition partners, or friendly populations might pay a future adversary disproportionate dividends. □

Notes

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53. "Army Co-Operation in the GAF: The Duties of Reconnaissance Units," 29 July 1942, AFHRA, file no. 512.625-3, 2.

54. Oberkommando der Luftwaffe, Führungsstab Ia/Ausb. Nr. 1300/44 geheim, "Merkblatt: Die Nachtschlachtflieger-Verbände," 20 May 1944, BA/MA RH 11 III/76.

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Editorial Abstract: Exercising strategic leadership involves the manipulation of microscopic perceptions and macroscopic expectations—a complicated process. However, understanding the process is less complex. Toward that end, Colonel Guillot defines and characterizes strategic leadership; he also addresses the components and nature of the strategic environment. Future leaders must develop competencies for dealing with the broad, new challenges of leading in that environment, a task that requires them to move from the art of the familiar to the art of the possible.

Strategic Leadership

Defining the Challenge

COL W. MICHAEL GUILLOT, USAF

THE ONLY THING harder than being a strategic leader is trying to define the entire scope of strategic leadership—a broad, difficult concept. We cannot always define it or describe it in every detail, but we recognize it in action. This type of leadership involves microscopic perceptions and macroscopic expectations. Volumes have been written on the subject, which may in fact contribute to the difficulty of grasping the concept. One finds confusing and sometimes conflicting information on this blended concept that involves the vagaries of strategy and the behavioral art of leadership. Sometimes the methods and models used to explain it are more complicated than the concept and practice of strategic leadership itself. Exercising this kind of leadership is complicated, but understanding it doesn't have to be. Beginning with a definition and characterization of strategic leadership and then exploring *components* of the strategic environment may prove helpful. Future leaders must also recognize the *nature* of that environment. Finally, they should also have some familiarity with ways of *developing competencies* for dealing with the broad, new challenges that are part of leading in the strategic environment.

What Is Strategic Leadership?

The common usage of the term *strategic* is related to the concept of strategy—simply a plan of action for accomplishing a goal. One finds both broad and narrow senses of the adjective *strategic*. Narrowly, the term denotes operating directly against military or industrial installations of an enemy during the con-

duct of war with the intent of destroying his military potential.[1] Today, *strategic* is used more often in its broader sense (e.g., strategic planning, decisions, bombing, and even leadership). Thus, we use it to relate something's primary importance or its quintessential aspect—for instance, the most advantageous, complex, difficult, or potentially damaging challenge to a nation, organization, culture, people, place, or object. When we recognize and use *strategic* in this broad sense, we append such meanings as the most important long-range planning, the most complex and profound decisions, and the most advantageous effects from a bombing campaign—as well as leaders with the highest conceptual ability to make decisions.

As mentioned earlier, strategy is a plan whose aim is to link ends, ways, and means. The difficult part involves the thinking required to develop the plan based on uncertain, ambiguous, complex, or volatile knowledge, information, and data. Strategic leadership entails making decisions across different cultures, agencies, agendas, personalities, and desires. It requires the devising of plans that are feasible, desirable, and acceptable to one's organization and partners—whether joint, interagency, or multinational. Strategic leadership demands the ability to make sound, reasoned decisions—specifically, consequential decisions with grave implications. Since the aim of strategy is to link ends, ways, and means, the aim of strategic leadership is to determine the ends, choose the best ways, and apply the most effective means. The strategy is the plan; strategic leadership is the thinking and decision making required to develop and effect the plan. Skills for leading at the strategic level are more complex than those for leading at the tactical and operational levels, with skills blurring at the seams between those levels. In short, one may define strategic leadership as *the ability of an experienced, senior leader who has the wisdom and vision to create and execute plans and make consequential decisions in the volatile, uncertain, complex, and ambiguous strategic environment.*

Components of the Strategic Environment

What is the strategic-leadership environment? One construct includes four distinct, interrelated parts: the national security, domestic, military, and international environments (fig. 1). Within the strategic environment, strategic leaders must consider many factors and actors. This construct is neither a template nor checklist—nor a recipe for perfection. The framework recognizes the fact that strategic leaders must conceptualize in both the political and military realms. Additionally, it illustrates how the strategic environment is interrelated, complementary, and contradictory. Leaders who make strategic decisions cannot separate the components, especially when they are dealing with the national security environment.

Strategic leaders must recognize and understand the components of the national security environment. The ultimate objectives of all US government personnel are those presented in the national security strategy. The strategy and its objectives shape the decision making of strategic leaders, who must understand the national instruments of power—political, economic, and military.

These instruments provide the means of influence—for example, political persuasion (diplomacy), economic muscle (aid or embargo), or military force (actual or threatened). Within the national security environment, strategic leaders should consider national priorities and opportunities and must know the threats and risks to national security, as well as any underlying assumptions. Understanding this environment poses a major undertaking for strategic leaders. It is also the foundation for understanding the military environment.

Personnel who aspire to be strategic leaders, especially within the Department of Defense, must thoroughly understand military strategy. Two reasons come to mind. First, because the military instrument of power has such great potential for permanent change in the strategic environment, all strategic leaders must recog-

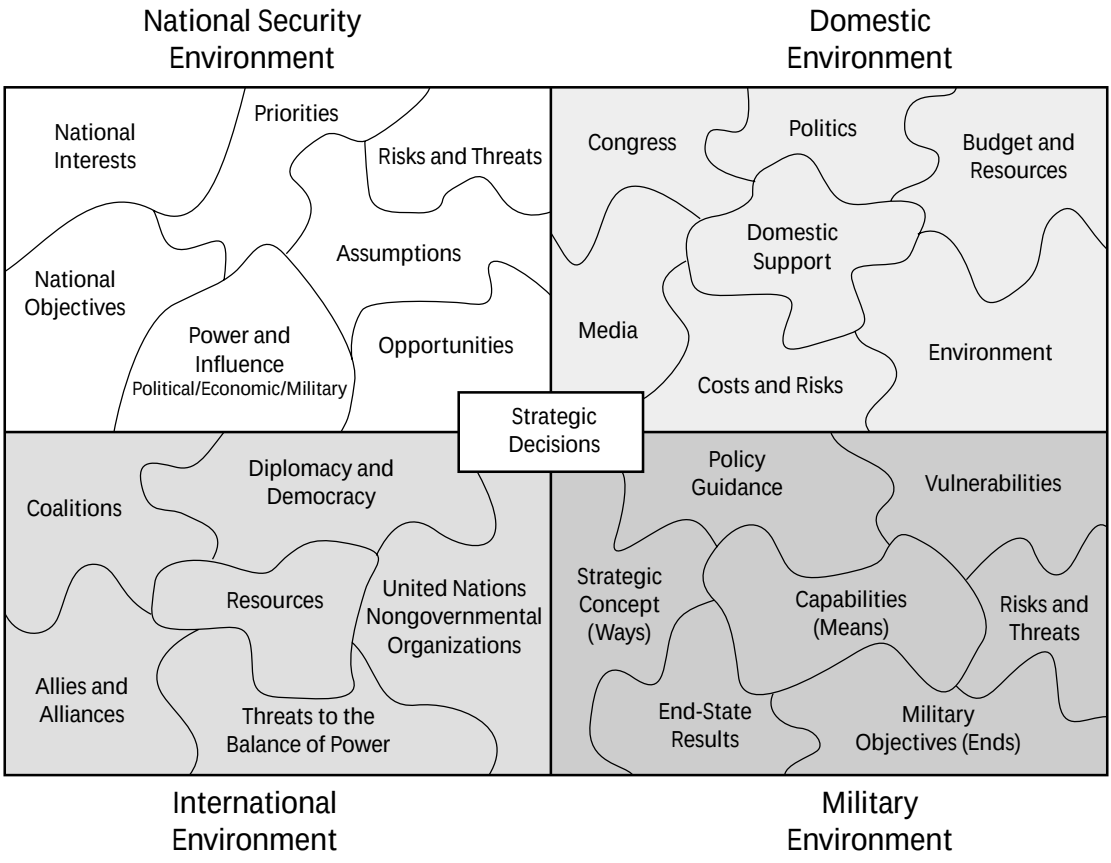

Figure 1. The Strategic-Leadership Environment

nize its risks and limitations. Second, because military experience among civilian leaders has dwindled over the years and will continue to do so, strategic leaders have a greater responsibility to comprehend policy guidance and clearly understand expected results. Only then can they effectively set military objectives and assess the risks of military operations. Such leaders must develop and evaluate strategic concepts within the military environment and recognize potential threats. Finally, strategic leaders will have to balance capabilities (means) against vulnerabilities and, in doing so, remain aware of the domestic coalition as a major influence.

Since the founding of our nation—indeed, even before the signing of the Constitution—the domestic environment has influenced our leaders. Over the last 200 years, little has changed in this regard; in fact, most people would argue that domestic influence has increased. For instance, strategic leaders today must pay particular attention to the views, positions, and decisions of Congress, whose power and influence pervade many areas within the strategic environment—both foreign and domestic. Congress has the responsibility to provide resources, and we have the responsibility to use them prudently and account for them. This partnership encompasses national and local politics, budget battles for scarce dollars, and cost-risk trade-offs. Strategic leaders cannot ignore either the congressional part of the domestic environ-

ment—even though the relationship can sometimes prove difficult—or support from the population. Such support is extremely relevant in democracies and certainly so in the United States. The problem for the strategic leader lies in accurately measuring public support. Accurate or not, senior leaders in a democracy ignore public support at their peril. Actually, because of their power and influence, components of the media make it impossible to ignore domestic issues. Strategic leaders must know how to engage the media since the latter can help shape the strategic environment and help build domestic support. Finally, even though the political will may change, environmental activism will continue to affect the decisions of strategic leaders at every level. Environmental degradation remains a concern for strategic leaders in this country, as do problems in the international environment that call for strategic decisions.

When considering the international environment, strategic leaders should first explore the context—specifically, the history, culture, religion, geography, politics, and foreign security. Who are our allies? Do we have any alliances in place, or do we need to build a coalition? What resources are involved—physical or monetary? Is democracy at stake—creating or defending it? Leaders should also consider threats to the balance of power (BOP) in the environment and the involvement of both official and unofficial organizations. The United Nations may already have mandates or resolutions that would affect our proposed operations or interests. Nongovernmental organizations may also be willing to help—or perhaps require help. Each of these concerns is legitimate and makes the international environment the most challenging and unfamiliar of them all.

This framework for the components of the strategic environment is simple in design yet complicated in practice. Most US government personnel are intimately familiar with the national security and military environments since they are linked (i.e., military strategy follows directly from national security decisions). But strategic leaders must recognize that the two greatest influences on their decisions come from the domestic and international environments. To lead effectively, they should use what is most familiar and be able to synthesize what influences their strategic decisions.

The four components of the strategic environment present a challenge for strategic leaders. The national security environment, with its many taskmasters, will drive both strategic decisions and military strategy. Leaders will feel great influence from the familiar domestic environment and must have its support for strategic action. Further, strategic leaders can be surprised and their decisions thwarted if they fail to understand the international environment sufficiently. Knowing the disparate components of the strategic environment is the first step in grasping strategic leadership. Understanding the *nature* of the strategic environment and strategic decisions is the second step.

Nature of the Strategic Environment

The strategic-leadership environment differs from the climate at lower levels of leadership. We should view the nature of this environment both broadly—examining consequential decisions and changes in performance requirements—and narrowly.

Consequential Decisions

By nature, strategic leadership requires consequential decision making. All decisions have consequences, but in the strategic context, they take on a different character—specifically, they are planned, generally long term, costly, and profound.

Consequential decisions occur only at the higher levels within organizations. Generally, decision makers in the top 20 percent of the organization—the people who have ultimate control of resources—plan and execute such decisions. They also think out the implications of their decisions in advance. That is to say, the decision makers analyze and evaluate

the possible, probable, and necessary ramifications of a decision beforehand. Some people argue that the sergeant on patrol in Kosovo or the bomber crew over Afghanistan can make strategic decisions in a split second and thus become strategic decision makers. No doubt, armed forces and government officials do make lethal, destructive, and sometimes regrettable decisions. However, these determinations are considered tactical opportunities or, worse, operational blunders rather than planned, consequential decisions. Planning becomes more important when one considers the long-term nature of consequential decisions.

Such decisions require years to play out. Indeed, in most cases strategic decision makers may not be around to witness the actual consequences of the decision, making it all the more essential that they carefully consider all implications before taking action. Clearly, a hasty consequential decision can become very costly.

One may classify these attendant costs as either immediate or mortgaged. For instance, some consequential decisions—such as declaring war or beginning hostilities—can have immediate costs or effects. The cost in lives could become very heavy in a matter of days. World economic costs could mount within weeks while markets collapse within hours. Mortgaged costs of consequential decisions, however, refer to lost opportunities and "sunk" costs. We see such consequences, for example, when organizations commit to huge purchases for weapons systems over a decade-long time frame. Of course in the strategic environment, costs are measured not only in dollars but also in influence (e.g., the costs of supporting one nation over another or the costs of not supporting a particular position). Many times, the decision becomes a matter of sunk costs—gone forever with no chance of recovery. Up to this point, we have considered only the negative effects of costs on consequential decisions. Suffice it to say that many consequential decisions have the aim of decreasing, avoiding, or postponing costs. In fact, some of the least costly consequential decisions turn out to be the most profound (e.g., expanding free-trade agreements and the NATO alliance, reducing the number of nuclear arms, etc.).

Consequential decisions are profound because they have the potential to create great change, lead trends, alter the course of events, make history, and initiate a number of wide-ranging effects. They can change societies and advance new disciplines. Most importantly, an entire organization, a segment of society, a nation, or humanity in general recognizes such decisions as profound.

Performance Requirements

The stratified systems theory of T. Owen Jacobs and Elliott Jaques classifies the performance requirements for leaders in organizations as direct, general, and strategic (in military parlance: tactical, operational, and strategic, respectively).[2] Distinct elements define the leadership environment within each level. Unmistakable differences among the three levels include complexity, time horizon, and focus.

Most people spend their careers leading at the direct or tactical level (squadron or battalion commander, branch chief, or below). In this environment, the leader interacts directly with the same people every day by maintaining a direct span of control, all the while executing plans, following policies, and consuming resources with a defined goal in mind. The time horizon is very short—normally less than one year. At the direct level of leadership, communications generally occur within the same organization and focus exclusively on the internal audience. Because leaders spend more time at this level than any other, it becomes familiar and comfortable.

Some leaders, however, will mature and move to the general or operational level, where performance requirements begin to change. Direct leadership diminishes as the span of control shrinks. At this level, leaders develop plans, write some policies, and allocate resources among subordinate organizations. The time horizon also increases—to as much as five years. Operational leaders begin to shift the focus of communication and energy outside the organization, recognizing and

questioning how the external environment will affect their organizations. Group commanders, brigade commanders, and division chiefs represent this general, analytic level of leadership.

From the perspective of budding strategic leaders, performance requirements for the strategic level change the most and are the least familiar. The power of influence becomes more important than the power of the position. Conceptual ability and communications become essential. Both focus not only on how the external environment will affect the organization, but also—and more importantly—on how the organization can influence that environment. The most challenging of the performance requirements is the time frame for making decisions, which can extend to 20 years and beyond. The leader at this level must think in terms of systems and use integrative thinking—the ability to see linkages and interdependencies within large organizations (or systems) so that decisions in one system will not adversely affect another system.[3] The challenges are great, the stakes are high, and the performance requirements are stringent.

Volatility, Uncertainty, Complexity, and Ambiguity

Framing the nature of the strategic environment in a broad context helps us understand the magnitude of the challenge. Strategic leaders operate in an environment that demands unique performance requirements for making consequential decisions. If we look more closely at this environment, we discover four characteristics that define the challenge to strategic leadership in a narrow sense: volatility, uncertainty, complexity, and ambiguity.[4]

Now that the world is no longer bipolar, the strategic landscape has become more volatile. Violence erupts in the most unlikely places and for seemingly innocuous reasons. The last few years have given us a glimpse of this volatility: ethnic cleansing in Bosnia and Kosovo, war and terrorism in the Middle East, and terrorism within the United States. The challenge for strategic leaders lies in anticipating volatile scenarios and taking action to avert violence.

In most cases, these leaders will be asked to conduct this action in a landscape of uncertainty—the deceptive characteristic of the strategic environment. They face situations in which the intentions of competitors are not known—perhaps deliberately concealed.[5] At other times, they will even have reservations about the actual meaning of truthful information. Their challenge is to penetrate the fog of uncertainty that hugs the strategic landscape. Comprehending the nature of the strategic environment constitutes the first step toward solving its complexity.

The interdependence of the components in the strategic environment produces complexity—its most challenging characteristic. Integrative thinking is essential to recognizing and predicting the effects of a decision on this "system of systems." If leaders are to anticipate the probable, possible, and necessary implications of the decision, they must develop a broad frame of reference or perspective and think conceptually.

The ambiguous character of the strategic environment stems from different points of view, perspectives, and interpretations of the same event or information. Strategic leaders have to realize that broad perspectives (e.g., using team approaches to solve problems and gain consensus) help eliminate ambiguity and lead to effective strategic decisions.[6]

The nature of the strategic environment is challenging because of the consequences of decisions and unique performance requirements. Although faced with an environment characterized by volatility, uncertainty, complexity, and ambiguity, aspiring strategic leaders can nevertheless learn to master it. Indeed, by acquiring certain skills and competencies, they can transform this environment into something more stable, certain, simple, and clear.

Developing Strategic Leadership

If becoming a strategist is the "ends," then leadership is the "ways," and development is the "means." Learning to become a strategic leader requires special preparation in several

areas. First, one must understand how such a leader develops—in essence the anatomy of strategic leadership. Second, one should recognize some of the essential competencies a strategic leader must have. Finally, the prospective leader needs to assess his or her current abilities and commit to a development plan.

Anatomy of a Strategic Leader

Development of a strategic leader involves a number of important aspects. First, the most important, indeed foundational, part of this preparation concerns values, ethics, codes, morals, and standards. Second, the path to strategic leadership resembles the building of a pyramid (fig. 2). Shortcuts do not exist, and one can't start at the top—strategic leaders are made, not born. Strategic leaders gradually build wisdom, defined as acquiring experiences over time.[7] One must also remember that certain activities can accelerate these experiences and widen perspectives. Leaders should know that even though some individuals with strategic competency may not become strategic decision makers, they can still influence and contribute to decisions. Additionally, having strategic competency will allow one to fully understand strategic decisions and perspectives.

- Strategic leadership begins with organizational values, standards, and ethics—the foundation of our profession.
- Upon this foundation, the officer develops an abstract body of expert knowledge based primarily on experience. Continuing education can influence, expand, and accelerate development.
- Next, the officer is exposed to command responsibility and accountability—a vital phase during which the officer gets his or her first real taste of consequential decision making.
- Further education in strategic-thinking skills enhances the officer's competence. In each case, an officer could have opportunities to exercise strategic competency in support of a strategic leader.
- Ultimately, the officer will participate in strategic decision making and become a strategic leader.

Figure 2. Anatomy of a Strategic Leader

Competencies

It is difficult to imagine an all-inclusive list of competencies required for strategic leadership. However, some skills seem essential—vision, for instance, which allows the strategic leader to focus on the future and, in fact, build that future. Vision makes leaders proactive in the strategic environment rather than reactive. Furthermore, they should become transformational in order to inspire people toward common goals and shared values; they must anticipate change, lead change, and foster a mind-set of change; they should critically analyze their own thinking to make decisions logically; they should foster an attitude of creativity in their operations and organizations; they must audaciously seek novel ideas and understand how to frame decisions and organize chaos; and they should know how to build effective teams and gain consensus within large organizations. When consensus fails, strategic leaders must negotiate effectively, or they put success at risk. Many times, this kind of success is directly related to the cultural sensitivity and cross-cultural communications ability of the leader. Finally, the strategic leader must assume the role of both teacher and mentor. As Noel Tichy reminds us, great leaders are great teachers. They have a teachable point of view and invest in developing other leaders.[8] The competencies mentioned above form the basis of an education for aspiring strategic leaders.

Assessment and Development

Becoming a strategic leader is a daunting challenge. It starts with taking stock of leadership abilities, conceptual capacity, and interpersonal skills. A thorough self-assessment will help identify strengths and weaknesses. Such assessments can examine personality type, leadership motivation, originality, innovation, tolerance, teamwork, and conceptual ability. These assessments are like the starting point on a map, letting prospective leaders know where they are so they can take the best route to their destination. Completing a detailed self-assessment is also the first step in commitment to the personal- and professional-development process required to become a strategic leader.

As a follow-up to the self-assessment, aspiring leaders should ask themselves a series of questions: What are my strengths? How can I capitalize on them? Where are my weaknesses? What can I do about them? Where do I want to be in the future? How can I get there? Do I really want to commit to development? The last question is the most difficult one.[9] Those who answer yes are ready to begin the journey toward becoming strategic leaders.

At this point, leader candidates should volunteer for and accept challenging assignments—especially in areas in which they might not have worked before. These could include moving into a different functional area, accepting joint assignments, or working in an interagency environment. Such taskings tend to accelerate experience and broaden perspectives. Furthermore, pursuing a formal course of study at senior service colleges and participating in other education programs would broaden one's knowledge and conceptual ability. Self-learning is also valuable—especially reading. All strategic leaders are voracious readers—and they read outside their normal area of expertise, again, to expand their perspective and increase their conceptual ability. In fact, many of them are experts in a number of unrelated fields. Becoming a "dual expert" helps one think in multiple dimensions.

After committing to some or all of these development activities, potential leaders should reflect on each activity as a way of mining the total benefit and seeking greater meaning. They will also benefit from mentoring other leaders and being mentored themselves. When mentors share their experiences, they help others know and understand them. As Tichy says, sharing experiences or "telling stories" shapes our own attitude, behavior, and point of view.[10] We become the story, and the story guides our lives. Gen Dwight Eisenhower endorsed mentoring when he explained that the best way to become a good decision maker is to be around others who make decisions.[11]

Conclusion

The many components of the strategic-leadership environment challenge even the best leaders. The monumental consequences of strategic decisions call for individuals with unique performance abilities who can navigate the volatility, uncertainty, complexity, and ambiguity inherent in the nature of those decisions. Aspiring leaders can rise to the challenge by undergoing self-assessment and personal development. Accepting the demands of strategic leadership involves a transition from the art of the familiar to the art of the possible. This is the realm of strategic leadership and the strategic environment. □

Notes

1. *Webster's II New Riverside University Dictionary*, 1988 ed., s.v. "strategic."
2. T. Owen Jacobs, *Strategic Leadership: The Competitive Edge* (Fort Lesley J. McNair, Washington, D.C.: Industrial College of the Armed Forces, 2000), 24.
3. US Industrial College of the Armed Forces, chap. 1, "Overview," *Strategic Leadership and Decision Making: Preparing Senior Executives for the 21st Century* (Washington, D.C.: National Defense University Press, 1997), on-line, Internet, September 2000, available from http://www.ndu.edu/inss/books/books%20-%201999/Strategic%20Leadership%20and%20Decision-making%20-%20Feb%2099/cont.html.
4. Ibid.
5. Ibid.
6. Ibid.
7. Jacobs, 46.
8. Noel M. Tichy with Eli Cohen, *The Leadership Engine: How Winning Companies Build Leaders at Every Level* (New York: Harper Business, 1997), 3.
9. US Industrial College of the Armed Forces, chap. 7, "Developing Strategic Leaders," *Strategic Leadership and Decision Making*.
10. Tichy and Cohen, 77.
11. Edgar F. Puryear Jr., *American Generalship: Character Is Everything: The Art of Command* (Novato, Calif.: Presidio Press, 2000), 232.

Maj Gen Benjamin D. Foulois

America's First Military Aviator

ASPJ STAFF*

Benjamin D. Foulois belonged to the first generation of US airmen who moved the Air Service from its rudimentary beginnings to full stature as an independent service. Born in Washington, Connecticut, in 1879, he enlisted as a private in the First United States Volunteer Engineers in 1898, thus beginning an active military career that spanned nearly four decades. His early service involved him in small wars that characterized military involvement in the late nineteenth and early twentieth centuries: the Spanish-American War, the Philippine Insurrection, the Cuban Pacification, and the Mexican Punitive Expedition.

By 1909 Foulois and two other Signal Corps officers had begun to experiment with the Wright brothers' military airplane. He taught himself to fly through trial and error and by learning as much as he could from his active dialogue with the small aviation community of the day (including the Wrights). As one of the most experienced aviators of the pre–World War I era, he suggested improvements in instrumentation, design, and support systems and set several world records in aviation.

By 1916 Foulois had planned and executed the first squadron deployment by air and the first cross-country flight. Such experience made him the logical choice to command the 1st Aero Squadron, tasked to support Gen John J. Pershing's expedition to capture Pancho Villa later that year. His duties during the Mexican Punitive Expedition brought him into contact with William "Billy" Mitchell, who, up to that point, had never flown in an airplane. Mitchell and Foulois clashed over who was to blame for the squadron's lackluster performance in Mexico, and the two remained bitter rivals for the rest of their careers.

By 1917 Foulois found himself leading planning efforts to take the fledgling Air Service to war. As a major, he submitted requirements and a $640,000,000 budget to expand the service for the European conflict, earning him temporary promotion to the rank of brigadier general and appointment as chief of the Air Service, American Expeditionary Forces, in November of that year. Once again, however, he came into conflict with the flamboyant and politically connected Mitchell, who garnered publicity and glory while Foulois served as assistant chief of the Air Service, Services of Supply. After the war, he was appointed assistant military attaché to The Hague, Netherlands, and to Berlin. In the dramatic demobilization that followed World War I, Foulois returned to his permanent rank of major; once again, Mitchell bested him by retaining his rank of brigadier general.

After a series of important assignments in the 1920s, Foulois reported to the Office of the Chief of Air Corps in 1930 and earned the Mackay Trophy in 1931 for leading the Air Corps's annual exercises. On 19 December 1931, he became chief of the Air Corps. His vision and persistence laid the foundation for moving the Air Corps from a supporting branch of the Army toward full status as an independent service. Foulois's most important legacy during this phase of his career involved the creation of General Headquarters Air Force, precursor of the independent air service. Unfortunately, the service's poor performance in the airmail controversy of 1934 tainted Foulois's reputation and led to his retirement on 31 December 1935.

Biographer John Frisbee relates a story that illustrates Foulois's famous sense of humor: "While he was deadly serious about airpower, he was the kind of man who loved a good laugh with his friends. On one occasion he showed up for a luncheon with a note hung around his neck: 'This is General Benjamin Foulois. He requires two martinis before lunch.' It was signed by the Surgeon General." From his retirement in 1935 until his death in 1967, General Foulois remained an enthusiastic and insightful advocate of airpower.

To Learn More . . .

Foulois, Benjamin D., with C. V. Glines. *From the Wright Brothers to the Astronauts: The Memoirs of Benjamin D. Foulois*. New York: McGraw-Hill, 1968.

Frisbee, John L. *Makers of the United States Air Force*. 1987. Reprint, Washington, D.C.: Air Force History and Museums Program, 1996.

Shiner, John F. *Foulois and the U.S. Army Air Corps, 1931–1935*. Washington, D.C.: Office of Air Force History, 1984.

*Although Lt Frederick Humphreys took lessons from the Wright brothers in 1909, thus becoming the first military pilot to solo, Foulois had a much longer career and greater influence on the evolving Air Service. For those reasons, the *ASPJ* editorial staff takes a small degree of historical liberty in characterizing Foulois as the first military aviator.

The Not-So-Forgotten War

Fodder for Your Reading on the Air War in Korea a Half Century Later*

DR. DAVID R. METS

SOME YEARS AGO, Clay Blair published a good book on US experiences in Korea titled *The Forgotten War.* It is forgotten no more—Blair helped revive that memory, as did the passing of the war's 50th anniversary. In 1950, we were feeling our way in a new, bipolar, and nuclear world. Today, the aspirant air strategist is also facing a new world. It is no longer bipolar, weapons of mass destruction (WMD) threaten to spread, and the means and motivation for their long-range delivery again upset our sense of security. The Korean War truce took effect in July 1953—just 50 years ago. Perhaps it is an altogether proper time to look over the literature on that war to add to your fodder for professional study.

As with the previous articles in this series, we shall review three recent books on our subject and establish a rough outline of the air war in Korea to serve as a basis for your lifelong professional reading program. Col Rod Paschall, an experienced soldier-scholar, is the author of the first and will provide an introduction to our study. The second is a memoir by Lt Col Cecil Foster, an air warrior and Sabre ace with nine kills in Korea. Our final book is authored by Allan Millett, a retired Marine Corps colonel. This article will conclude with the usual 12-book sampler, which you can use to get a general overview of the subject and then further your efforts towards depth and mastery.

An air warrior-scholar can find a splendid, short summary of the Cold War's first armed conflict in Paschall's *Witness to War: Korea.*[1] Its author is a soldier-scholar of the first rank, well qualified to produce such a work from

*This article, as with all those in the Fodder series, is dedicated to a great military educator. This one honors the late Col Roger Nye, USA, who suggested the idea for the series. I also wish to thank Prof. Dennis Drew for his excellent assistance in the preparation of this article. Its remaining flaws are entirely my responsibility.

the perspectives of both experience and study. A West Point graduate of the class of 1959, Colonel Paschall has had much experience in Asia, including tours in Vietnam, Laos, Cambodia, and Korea. Perhaps Paschall's most satisfying tour was as the commander of the Army's famed Delta Force, a position which lends great credibility to his status as a leading authority on special operations. While on active duty, he was awarded the Silver Star

A Time Line for the Korean War

1882–88 United States–Korean Treaty of Amity

The United States concluded a treaty of friendship, navigation, and commerce with Korea and later deployed a military assistance group to the peninsula to help train a Korean army. Chinese and Japanese interests in the area would often clash, and the Koreans, on occasion, tried to use the United States as a counterweight to one or the other. Although Russia had an interest in Korea, it lost the Russo-Japanese War in 1905, allowing Japan to dominate Korea until 1945.

1 October 1949 Chinese Communist Victory over Nationalists

The Chinese communists had fought a lengthy battle against the nationalist forces of Chiang Kai-shek long before Pearl Harbor and did not lose sight of that battle during the war. Soon after Hiroshima was bombed and the Japanese departed the Asian mainland, the communists were able to again concentrate on their domestic struggle. The United States had long been involved in these struggles, and many Americans advocated armed intervention. Although President Truman avoided becoming involved with that conflict and narrowly won the election of 1948, the fall of the Chinese Nationalists and the creation of the People's Republic of China (PRC) in 1949 was blamed on him. Meanwhile, in the opening rounds of the Cold War, things had gone from bad to worse in Europe—the administration's first priority for defense. The prospects for the Democratic Party in the election of 1952 were indeed poor.

12 January 1950 Dean Acheson's Perimeter Speech

In a 12 January 1950 speech to the National Press Club, Secretary of State Dean Acheson defined US national interests in the Pacific and implied that Korea lay outside those interests by drawing the defensive perimeter through the offshore islands along the Asian coasts. Many argued that Acheson's definition of US interests had given the communists a green light to invade South Korea.

25 June 1950 North Koreans Invade South Korea

The initial phase of the war was a triumph for the North Koreans, who came close to driving the United Nations (UN) forces into the sea. Defeat was near and some prominent Army officers credited the efforts of the fledgling US Air Force for preventing that outcome. At first, the occupation forces were the only ground and air units available to General of the Army Douglas MacArthur. Their mission had been restricted to the defense of Japan, which limited their training and equipment. Airmen only had short-range jet interceptors and trained for defensive counterair (DCA)—they had no air-to-ground training. Soldiers were likewise limited in their equipment and training.

15 September 1950 Inchon Landing

However, as the UN forces were beleaguered within the Pusan Perimeter, MacArthur executed an end run around the communist right flank with an amphibious landing at Inchon. Although he took this action in the face of the doubting Joint Chiefs of Staff, it succeeded brilliantly. The North Koreans were cut off and in a vise between the Eighth Army coming out of Pusan and the X Corps cutting off their retreat in a thrust eastward from Inchon and through Seoul. Once on a roll, President Truman and the UN changed the objectives from the mere restoration of the status quo to the reunification of Korea by force. MacArthur's soldiers charged northward and believed it would be over by Christmas.

26 November 1950 The PRC Enters the Korean War

The Chinese communists had sent some rather clear signals—particularly in retrospect—that a UN army approach to the Yalu River border between Korea and China would not be tolerated. Notwithstanding those signals, MacArthur seemed surprised when China entered the war by launching a massive offensive aimed between the Eighth Army in the west and the X Corps in the east. Soon, UN forces were in a helter-skelter retreat that did not end until they were south of the 38th parallel, the prewar line. Gen Walton H. Walker, Eighth Army commander, was killed in an accident around Christmas, and Gen Matthew B. Ridgway took over and launched a counteroffensive.

11 April 1951 MacArthur Relieved

President Truman was concerned the Soviets might take advantage of the US preoccupation with Korea and invade Western Europe, an action that could then escalate into World War III and the use of nuclear weapons. General MacArthur, while still popular in the United States, was losing the confidence of the allies and acted beyond his authority often enough to cause President Truman to relieve him. The war stagnated in the vicinity of the Korean peninsula waist, and as the stalemate deepened, the UN returned to its initial objective—the reestablishment of the status quo.

23 June 1951 Soviet Cease-Fire Proposal

On the basis of the Soviet Union's proposed cease-fire, the two sides met at the negotiating table. Although fighting continued, each side mounted only relatively minor offensives. Progress toward a truce was slowed by many minor sticking points. However, in the end it was the repatriation of North Korean prisoners of war (POW)—forcing released soldiers to go back to their homes—that delayed a settlement for many months. President Syngman Rhee made that a moot issue when he released several thousand North Korean POWs, who then disappeared into the South Korean landscape.

27 July 1953 Korean War Armistice

The agreement reached in the armistice was roughly that which had been desired by the UN at the outset—a status quo near the waist of the Korean Peninsula. The war had also improved the UN's prestige, had made NATO stronger, and had shown the Soviets that there were limits to their expansion without war. Furthermore, the PRC had proven itself a great power by stopping the UN armies short of their maximum goals.

and the Purple Heart. He earned a master's degree from Duke University and taught military history at West Point. Although his writing is well organized and readable, an air advocate may take exception to some of the things he has to say.

Witness to War provides a good overview of both the land and air operations and is organized in a near-chronological fashion. Paschall provides his own descriptions and analyses and then adds the first-person accounts of combatants from all levels between private and general. These go beyond American experiences and include the accounts of South and North Korean soldiers. Paschall reveals the experiences of UN-affiliated guerrillas operating in North Korea as well as those of the North Korean POWs held in the south—their trials and the long repatriation struggle to determine their fate at the end of hostilities. He also lists the general sources he used for each chapter, which could serve as a recommended reading list. Although Paschall amply demonstrates the misery of the Korean War, he also stresses its secondary status when compared to home defense and the buildup in support of NATO.

Although *Witness to War* states that Korea was a "forgotten war," it denies that it was either futile or the "wrong war." In spite of its costs, Paschall insists that it was necessary to the development of the national-security strategies of containment and collective defense.[2] In addition, the US refusal to coerce prisoners to go back to their communist world showed America at her best. That selfless act forced the United States to tolerate a considerable delay in concluding the truce. Insofar as Colonel Paschall deals with airpower, he does not denigrate it. Rather, he insists that airpower is most effective when used in conjunction with active ground operations, a stance which is compatible with Air Force doctrine. Airpower strategists have long recognized that interdiction works best when an active ground campaign imposes high rates of consumption upon the enemy, forcing him to depend on his lines of communication. This book is a good starter for building your personal picture of the Korean War.

With Paschall's overview in mind, the next step is to build a more detailed understanding of the context in which the war was fought. It should be a top-down approach starting with the international political setting. In the wake of the 50th anniversary of the war, there are many new books on that subject. One of the best is William Stueck's *The Korean War: An International History*.[3] It discusses in great detail the goals and actions of all the principal states involved in the war and the degree to which they achieved their objectives. He concludes that the North and South Koreans were, in the end, the main losers.

The Soviets caused a major distraction to the West at a moderate cost to themselves. Although the Western coalition lost many lives and used up considerable treasure, its NATO Alliance was solidified and equipped with real military muscle. It had made clear to the Soviets that further geographic expansion would not be cost-free. The Chinese communists had consolidated their revolution and established themselves as a great power on the world stage. Japan's economy received a large boost from war orders and the peace settlement, and its normalization with the United States probably was accelerated. The late 1940s was characterized by turmoil in all parts of the world, and the late 1950s were probably one of the most stable periods of the twentieth century. In general, world stability at the lowest possible cost has been the consistent goal of American foreign policy throughout this period.

Stueck is able to demonstrate better than most that foreign and military affairs are affected by much more than events on the battlefield. Each participating nation's culture and domestic politics had an impact on the way things went on the Korean Peninsula. US election politics were part of the equation. The Democrats had been in power for nearly 20 years, and New York's Thomas E. Dewey had run against Roosevelt in 1944 and lost. That result came notwithstanding that FDR was running for an unprecedented fourth term and was sick. He soon died, and Harry

Truman succeeded him. He had been selected as the vice presidential candidate for reasons other than his expertise in foreign policy—far from it, as almost all his experience was in domestic politics, though he had served in France during the First World War. Thus, Truman was deemed politically vulnerable in the election of 1948.

Notwithstanding turmoil in Europe, economic affairs there and at home, and Democratic losses in the off-year elections of 1946, the president upset aspirant Republican Tom Dewey in 1948—which only further aggravated the members of the opposition. The apparent success in the Berlin airlift and Truman's quick recognition of Israel had something to do with that outcome. Dewey's loss only further aggravated the members of the opposition, but Truman's euphoria did not last long. In 1949 the Chinese communists defeated Chiang Kai-shek, and the Soviets exploded a nuclear device, far ahead of predictions.[4] Although the North Atlantic Treaty had been signed that same year with important support from the Senate's Republican heavyweights, the wartime bipartisanship in the Congress was running thin.[5] All this was happening when the anticommunist frenzy stimulated partly by Sen. Joseph McCarthy was in its genesis and provided much fodder for the Republican political cannons.

12 January 1950: Dean Acheson's Perimeter Speech

Secretary of State Dean Acheson, speaking to the National Press Club in early 1950, declared that the US defense perimeter ran from Alaska through the Aleutian Islands and along the offshore islands of Asia and down through Okinawa to the Philippines. That was nothing new; many have claimed that Kim Il Sung took it as a green light to invade South Korea and reunify the peninsula under communist rule. Still, in the same speech Acheson declared that aggression against states outside the perimeter *would* be a concern of the United Nations.[6] That very spring, the National Security Council (NSC) produced a seminal strategy paper, NSC-68, in the wake of the fall of Czechoslovakia, the Berlin blockade, and the Soviet detonation of a nuclear device. It portended a huge stiffening of American foreign policy and the associated strengthening of her armed forces. However, that was not yet understood beyond the Washington inner circles.[7] Too, not enough time had passed for it to have had any practical effects in military terms.

25 June 1950: North Korea Invades South Korea

On 25 June 1950, the North Koreans crossed the 38th parallel with the consent and strong materiel support of the USSR. It was also facilitated by the Chinese communists. The United States had previously withdrawn almost all of its own troops from the peninsula and had deliberately confined its military aid for South Korea to defensive equipment. She feared that were President Syngman Rhee capable of offensive war, he would certainly undertake the conquest of the north.[8] The invaders, led by Soviet-made tanks and supported by a tiny and obsolescent air force of their own, rolled rapidly southward. There was a real danger that it would all be over before the United States or the United Nations could react.[9]

President Truman quickly dispatched air and naval units to assist the South Koreans. However, it was soon clear that those forces would not be enough, so he authorized General MacArthur to send ground troops. However, none of these forces was well suited to halt the invasion.

The chief mission for American ground forces stationed in Asia had been the occupation of Japan, and there had been little anticipation that they would be required to fight on the Asian mainland. Consequently, they had generally grown soft in that duty—their units were below full strength and had accomplished very little training. The Far East Air Forces (FEAF), under Lt Gen George E. Stratemeyer, were not much better off. There were three air forces assigned to the FEAF (Fifth in Japan; Twentieth on Okinawa; and Thirteenth in the

Philippines). Although it is true that these were the strongest air forces the United States had deployed overseas, they were generally only suited for a DCA mission near their home air base. Fifth Air Force, based in Japan, was almost wholly dedicated to the DCA mission and equipped with a substantial number of Lockheed F-80 Shooting Stars. These aircraft had a very short range and did not even have bomb racks installed; furthermore, the Fifth's crews had not been trained for the air-to-ground attack mission. Because early jet fighters had engines with limited thrust, they required long runways on which to accelerate to takeoff speed. Almost all of the runways in South Korea were too short to support these fighters. The Shooting Stars had not yet been equipped with droppable fuel tanks and thus could spend only a very few minutes over the battlefield. The jets were much easier to maintain in the field than the F-51 Mustangs and could generate twice as many sorties in a given period. Their superior speed enabled them to pass through enemy fire zones in far shorter times, which reduced their vulnerability, as demonstrated by a loss rate that was half that of the F-51. Even in World War II, the Mustang's liquid-cooling system had made it more vulnerable than other aircraft in low-level operations. Finally, the addition of pylons and drop tanks mitigated the F-80 and F-84 bomb load and range limitations.[10]

Fortunately, the United States had command of the sea in the maritime area surrounding the Korean peninsula and, for that matter, in the entire Pacific. That permitted the free flow of reinforcements and logistics, as well as the extensive use of naval airpower in support of air and surface operations. During the recent World War II, the Navy had found it unhealthy for its aircraft carriers to remain in one spot very long due to the Japanese air and submarine threats. During the Korean War, however, US naval dominance

An F-51, loaded with one bomb on each inboard station and unguided rockets on its outboard stations, taxis through flooded conditions to take off at a Korean airfield.

was so great that even escort carriers were able to remain on station for long periods without undue risk. The naval transition to jets had just begun, and the decks still contained many propeller-driven aircraft that were, fortuitously, well suited for the tactical-air-support role flown under the Korean War conditions. The F4U Corsairs and AD Skyraiders were launched close to the battlefield, could carry large munition loads, and were able to loiter over the battlefield much longer than jets. They were very important in support of ground forces—particularly in this early phase of the war.[11]

The minuscule North Korean air force did a bit of good work before American airpower arrived and quickly destroyed it. The United States then enjoyed air superiority in the battle zone for the rest of the war.[12] The enemy onslaught continued south down the Korean peninsula as UN forces were assisted by airpower from four aircraft carriers plus that which could reach the battle from bases in Japan and Okinawa. Moving some of the F-80 pilots back to F-51s—aircraft they had flown from World War II to just months before—helped to mitigate the problems the F-80s had flying the close air support (CAS) mission. The Air Force and its reserve components still had many of the F-51s in reasonable condition in Japan and back in the United States. These aircraft were moved forward to support the war effort; the USS *Boxer* set a record when it hauled 145 Mustangs across the Pacific in only eight days.[13]

Even B-29 Superfortresses and B-26 Invaders were flown in from Okinawa and Japan to be used in the CAS mission. CAS was an important mission that required employing ordnance on an enemy that was close to our troops. However, these aircraft had not been optimized for CAS, and their aircrews had not been trained to accomplish this mission. Nevertheless, the contributions of all of the various forms of airpower combined with the gallant defense of the Eighth Army—after being reinforced by a substantial number of US ground units that had arrived through South Korea's last remaining port—to stem the communist onslaught short of the sea at what became known as the Pusan Perimeter.[14] Meanwhile, General MacArthur and his staff had been planning a counterstroke.

15 September 1950: Inchon Landing

By early September, reinforcements through Pusan were stabilizing the front. New air units of all sorts were arriving on the scene. Though the North Korean forces contained many experienced combat soldiers, few of them had ever faced much in the way of air opposition.

Map of the Korean Peninsula

They had not been trained in ground-based defensive measures, neither passive nor active. Thus, as their line of communications stretched southbound, it became increasingly vulnerable to air interdiction. That, too, had a stabilizing effect. The Chinese themselves confessed that then and later the interdiction had largely prevented large-scale daylight offensives on the ground.[15] All the same, the US Air Force was less than three years old, and there had been little or no opportunity for training in joint air operations.

General MacArthur's headquarters was planning an end run to trap the North Korean forces and bring the war to an end. The notion was to use American naval and air superiority to land Marine and Army forces far in the North Korean rear. The lines of communications there were focused through Seoul, and the recapture of the city promised dramatic results.[16]

While Gen Walton Walker and his Eighth Army kept the enemy fixed around Pusan, a new X Corps was constituted under the command of Lt Gen Edward M. Almond to do the end run. On the surface of things, the amphibious operation—up a narrow channel plagued with huge tides, mines, and fortifications (presumably on both sides)—to land at Inchon appeared to be a reckless undertaking. There was much opposition to the plan not only in the Far East, but also in Washington.[17] Three of the four members of the Joint Chiefs of Staff had been cadets or company grade officers at West Point during the time MacArthur had served as its superintendent. Still, they had the temerity to express their skepticism and only reluctantly approved his plan. MacArthur prevailed over all his skeptics, both in the operation's planning and its execution, and one of his biographers refers to it as the one day in his life when he truly was a military genius.[18]

Because of the huge tides, the invasion had to be made with two landings. The first was to be at daybreak on Wolmi Do Island to take out the defenses overlooking the channel. On the next tide, 12 hours later, the rest would land at Inchon to climb the 12-foot stone seawalls there. Then they were to charge on Kimpo Airfield and Seoul to win a forward air base plus the hub of the lines of communications for the entire peninsula to the south.[19]

The air plan called for a division of functions among the services. The Navy and Marine air units were to provide CAS in the immediate vicinity of the landings. As soon as feasible, the FEAF would use its engineering force to restore Kimpo Airfield, enabling the Marine air units to deploy from their escort carriers. The Marine deployment to Kimpo was to be temporary, and that unit was to be replaced by Air Force organizations. FEAF was tasked to isolate the battlefield, provide CAS to General Walker's forces in the south, and provide airlift into Kimpo and Suwon once those fields were available. It was also to be prepared to drop an airborne regimental combat team into the battle area if so ordered. Air superiority, always the prime consideration, was practically a given at that juncture. However, centralized theater-level command of air assets under an airman—one of the central pillars of US Air Force doctrine—had not been implemented.[20]

In general, the FEAF assigned the task of supporting the Eighth Army to the Fifth Air Force and that of isolating the battlefield and continuing the bombing of industrial targets to the Twentieth. The planning of the latter was complicated by the worry that China or the USSR would intervene on the ground and come to the aid of the North Koreans. That made the interdiction campaign more difficult and more important. Preparations for a possible airdrop were complicated by the stateside location of both the troop-transport units and the paratroopers.[21]

Inchon worked like a charm. UN casualties at Wolmi Do Island and Inchon were blessedly light, and Kimpo was quickly taken.[22] The Marines quickly established their air operations at Kimpo, which put them much closer to the battlefield, allowing them to loiter longer in the area of the ground battle and spend less time flying home to refuel, reload, and return to the fight. Air Force C-54s landed at Kimpo and Suwon on 19 and 24

September, respectively, and began the increasingly vital materiel airlift to support the offensive. Seoul changed hands for the second of four times. The North Korean army was trapped between X Corps in the north and Eighth Army, now on the offensive from the south.[23]

The air support by the Navy and Marine aviators within the amphibious zone was a smashing success. They did not experience the communications difficulties that had been a problem at Pusan and were amply provided with very competent forward air controllers who directed the CAS, which caused many enemy casualties and little fratricide. Largely as a result of this experience, General Almond fell in love with the Marine Corps approach to CAS, which portended the controversy between the Air Force and the other services that has not yet completely disappeared.[24]

The UN had practically annihilated the North Korean army and had returned to the vicinity of the 38th parallel in short order—accomplishing the original objective. However, even before the landings, leaders in Washington and the Far East were thinking that once the UN forces were on a roll, Korea might as well be reunified by force. From hindsight, it is clear the Chinese communists were signaling they would not tolerate that result. They strengthened their forces in Manchuria and even issued warnings through indirect diplomatic channels. MacArthur and the leaders in Washington discounted those—the troops were ordered to continue the northward march. The result was a disaster.

26 November 1950: China Enters the Korean War

In late 1950, Chinese armies crossed the Yalu River into Korea and administered one of the most humiliating defeats to the mainly US arms in their entire military history.[25] The communists did so with no air cover. Stalin had earlier seemed to promise that if the Chinese intervened, he would supply air cover for their invasion. However, at the last minute he reneged and limited his support to air defense of the Chinese border with Korea.[26] In fact, the first air combat between the communist and UN forces did not occur for another 10 months.[27] The air forces did what they could to support the retreating marines and soldiers with fire and resupply. The Eighth Army moved by land down the west coast, and X Corps was evacuated by sea from Hungnam on the east coast. UN air superiority was sustained throughout the retreat. By February 1951, Seoul fell for the third time, and the line separating UN and communist forces had stabilized well south of the 38th parallel but significantly above the old Pusan Perimeter. General Walker died in an accident that winter and was replaced by Gen Matthew Ridgway. The latter resumed the offensive and moved the front line so that it straddled the 38th parallel by springtime and hovered there for the next two years.[28]

11 April 1951: MacArthur Relieved

Shortly after Ridgway resumed the offensive, a long-festering problem between President Truman and General MacArthur came to a head. Exercising his constitutional responsibilities as commander in chief of the armed forces, the president summarily relieved the general. MacArthur returned to the United States for the first time in years to widespread public acclaim. MacArthur was nothing if not a great orator, which is easily detected in his personal address to both houses of Congress. In the end, however, members of the JCS supported President Truman just as their duty required, and Truman's policy choices prevailed.[29]

Air mobility had its finest hour during the retreat through North Korea. A couple of small airborne operations had been mounted as the UN forces had moved north, but the timing on both was poor and the results were disappointing. However, on the retreat both aerial delivery and air landing had vital roles in the X Corps withdrawal from the Choshin

Reservoir. The C-119, C-46, and venerable C-47 were the principal aircraft involved. The 119 was vital because it could drop greater loads more quickly than the side-loading C-46 and C-47. This was crucial in emergency situations where rough landing fields could not be carved out for the others. However, that airplane was still new and not very reliable. The others had been well tested in World War II and were more capable of landing on rough, short fields. That was crucial where air evacuation was needed and feasible. The helicopter was just coming into service as a battlefield medical-evacuation bird, and, with the C-47s, it helped bring about the dawn of this very important function—saving lives and improving the morale of those in battle. The 47s picked up patients from the choppers and rushed them to full-fledged hospitals in Japan.[30]

The Chinese intervention also brought with it the MiG-15.[31] Much ink has been spilled over that—possibly because of American cultural conceit. We have long prided ourselves as being an exceedingly pragmatic and practical people. An important belief in the American psyche since colonial times has been that men of goodwill using common sense and energy can solve all of life's problems. From the earliest of times, in the American experience, the scarcity of labor with respect to the availability of cheap land has been conducive to a technological approach to solving problems. We have tended to believe that we are technologically superior to the Old World, and especially to Asia and Africa. Thus, it came as a big shock when the Japanese Zero outclassed our fighters, when the "backward" Russians came up with a nuclear device just four years after Hiroshima, and when the MiG-15 was so clearly superior to both the Air Force's F-80 Shooting Star and the Navy's F-9F Panther.[32] These things were unsettling; the Russians had done it again!

One of the books under review in this article contributes to the explanation of how the MiG-15 problem was overcome.[33] Part of the solution was to ship to the Far East two wings of the new F-86 Sabres—notwithstanding an urgent need for them in the air defense of the United States and in the buildup of NATO capabilities in Europe. However, even the F-86 was not superior to the MiG-15 in every respect. Neither its rate of climb nor its service ceiling was as good as that of the lighter MiG-15. It did have a sturdy airframe and greater maneuverability, particularly in the transonic region, due to its hydraulically assisted flight controls and a low-mounted, moveable stabilizer-elevator (slab or stabilator). The F-86 also had a G suit, heating and air-conditioning, a superior Sperry gunsight, and six Browning .50-caliber machine guns, which were smaller than the MiG-15's 37 mm cannons but had a substantially higher rate of fire. But those technological things were far from enough to explain the 10:1 kill advantage.[34] Cecil G. Foster, credited with nine kills, is ranked 12th among Korean War aces.[35] In his *MiG Alley to Mu Ghia Pass*, he tells an engaging story, most of which, understandably, deals with his experience in Korea. A native of Michigan, he had enlisted during World War II and was sent to navigator training but did not finish in time to get into combat. He remained in the service following the end of the war and got into pilot training. He graduated in 1947 with the first class to be directly commissioned into the new United States Air Force. Foster was initially checked out in jets and then sent for a tour in Alaska. He was soon caught in a reduction in force (RIF), discharged, and moved his family back to Michigan. He was barely back into civilian life when the Korean War broke out, and he found his way back into the US Air Force—this time with an F-86 checkout and an assignment to Korea.

Foster flew with the 16th Fighter Squadron of the 51st Wing stationed at Suwon. He got his first kills in the summer of 1952 and finished his combat assignment early in 1953. His memoirs are well written and can provide an evening of engaging reading for the aspiring air warrior-scholar. Although Foster seemed to have had great confidence in his airplane, its guns, and its gunsight, he nonetheless recognized the

MiG-15's technical advantages and the wide variation in his opponents' abilities. As a primary source, he provides some colorful details, and nothing in his narrations contradicts the conventional view of the air-superiority fight in the northern part of Korea. He was witness to only part of the struggle for air superiority. Therefore, his is not the complete air war story. He continued to serve as a fighter pilot with assignments in the United States, Africa, Europe, and Vietnam; he commanded a squadron and was hit by ground fire during one of his combat missions in Vietnam. Foster retired as a lieutenant colonel, decorated with two Silver Stars, a Distinguished Flying Cross, a Purple Heart, and many Air Medals—altogether fitting for a man who served his country well and lived to tell the tale.

Much more has been written about the Korean War, from many different perspectives, that could assist current airpower students in their search for the whole story. Robert Futrell's *The United States Air Force in Korea* is the most comprehensive and authoritative source on the whole air war.[36] He contends that the dominance enjoyed by UN air forces in MiG Alley was only partly dependent on the technical characteristics of the F-86 and more a function of the superior training and combat experience of the US flyers—many of whom had World War II combat experience. With the exception of some participating Russian pilots, most communist pilots did not have combat experience. The PRC had to create an air force from the ground up, a task made possible by massive Soviet assistance in both equipment and training.[37] Even with that help, it appears that communist sortie rates were far lower than those of the UN.[38] The human-resource pool, from which the PRC had to draw its pilots and maintainers, did not have much education or technical training—the majority having lived in rural areas without exposure to much mechanical equipment.[39] Although some Russian pilots were quite good, they strictly limited their combat operations to DCA in China and the extreme northern parts of Korea. Their policy to rotate units through combat every six weeks further mitigated their contributions.[40]

The American air history strongly indicates that two kinds of experience are vital to survival in air combat: total flying experience and experience *in the theater.* Naturally, there is a continuing desire to share the risk among all the members of the force; too, it is also beneficial to spread the combat experience to as many people as possible. Nowadays, the underlying theory of Red Flag is that the first 10 missions in-theater are the most dangerous; the training at Nellis is therefore built to be as close to the actual combat experience as possible to accumulate in effect those missions before engaging the enemy. Inadvertently, because of the recency of the combat experience in World War II in the USAF and the absence of it in the Chinese air force, that was a telling advantage.

In MiG Alley, the communists had the important advantage of operating in their own radar environment and very near their own sanctuary and airfields—similar to the British advantage during the Battle of Britain. US crews had to fly 200 miles—beyond their radar coverage—to engage the enemy for a very limited amount of time and then fly another 200 miles to find a safe landing site. Nevertheless, there were considerations other than combat in MiG Alley that affected the air war over Korea and the attainment of air superiority. Wishing to avoid a nuclear confrontation, Soviet dictator Joseph Stalin was careful to avoid direct confrontation with US forces on the ground. Although he deployed major air units to the region, he gave them strict orders to operate on the defensive at the Chinese border with Korea and nothing more. Russian airmen, therefore, made no attempt to go farther south to the area of the battle and went to great lengths (even suicide) to avoid capture by the UN forces and expose their participation. Only after the new Chinese air force began to participate was there any threat of communist airpower moving southward—but without Soviet participation.[41]

Foster's experience had little to do with offensive counterair (OCA) operations against enemy airfields in Korea but is well covered in Conrad Crane's recent *American Airpower Strategy in Korea, 1950–1953*.[42] In the first desperate days of the war, the UN air forces quickly destroyed the North Korean air force and provided CAS for the retreating troops to help prevent a much worse outcome. After the Chinese offensive and UN counteroffensive were spent—Seoul having changed hands two more times—the war of movement was replaced with a war of position. CAS then became less profitable while at the same time becoming more difficult and dangerous. The Chinese, trained in the school of hard knocks, learned to protect themselves from enemy airpower more effectively and no longer left their troops in the open. From the summer of 1951 onward, OCA and AI became relatively more important.

Interdiction also became more difficult in the war of position. When the enemy troops were not actively engaged with our forces, their materiel consumption was much reduced. That diminishes their resupply requirements, which results in fewer targets traveling along the lines of communication. That was also true in World War II and Vietnam. The communists also learned from their experiences that CAS could be a big help to troops on the ground. The MiG-15's short range then became a big disadvantage because it forced the communists to construct airfields near the front if they wanted these aircraft to provide CAS. Crane notes that the communists were soon making substantial efforts to build airfields farther south in North Korea. Although the communists had made daytime B-29 operations along the Yalu River prohibitive, the short range of their jets could not extend that prohibition very far to the south. Thus, as communist airfields close to the front neared completion, B-29s buried them in bombs. In that way, the Superfortresses made a very substantial contribution to air superiority over the battlefield—something the Army has come to expect, and perhaps take for granted, since the middle of World War II.[43]

The OCA campaign to destroy airfields was a clear success; however, other air-to-ground missions achieved mixed results and continued to generate interservice arguments. Various interdiction efforts were undertaken during the next two years, but the communists were always able to get enough materiel through to keep their troops alive. Air advocates argue that those AI efforts prevented the communists from mounting a major offensive; Army soldiers and marines have declared that the Air Force had not strangled the enemy, as Operation Strangle had seemed to promise. Air Force partisans state that while CAS had been a success, it would have been even better had theater-level centralized control been used. Other services argued that the Air Force disliked the CAS mission and, as a result, had never bought an airplane optimized for that mission—an argument that continues today. Although the A/OA-10 aircraft, built in the 1970s, was specifically developed as a CAS aircraft, the current issue is how long it will remain in the inventory. The original service life could be reached in FY 2005 and has caused some to again question the Air Force's commitment to CAS. The service life was revised, and some current long-range plans show the A/OA-10 in the fleet through FY 2028, a fact which supports airmen who deny any intention of doing away with the A/OA-10 aircraft.[44] My own opinion, for what it is worth, is that the United States hung on for three long years—right on the borders of two communist giants and 8,000 miles away from our home. That could not have happened without air superiority, which was achieved and maintained in good style; about that there can be no argument. If the interdiction case cannot be as well sustained for the sister services, the fact remains that many senior Army officers, including General Walker himself, have testified that without the CAS in the summer of 1950, the soldiers would have been driven into the sea.[45]

The B-29 Superfortress entered service against Japan in 1944, dropped nuclear weapons at Hiroshima and Nagasaki, and later served as FEAF's principal heavy bomber. The B-50 and B-36 were the most capable bombers during the Korean War. However, they were tasked to support strategic deterrence and were withheld from use in Korea by Gen Curtis E. LeMay, the commander of Strategic Air Command.

Retrospect

This is being written at the 50th anniversary of the end of the Korean War. As always, milestone 50 is characterized by a host of new works looking back from the perspective of time. The agonies of the period have diminished in their impact; there are still enough survivors to provide their memories. I have already alluded to one such book in the Paschall tome above; here we turn to a review of another done by one of the national experts on the subject of the war—one who has written much about it and who has also traveled extensively in Korea.

Allan R. Millett is certainly well qualified to produce *Their War for Korea*.[46] He is a prominent military historian with long service as a professor at Ohio State University—the institution that awarded him the PhD in 1966. Although his interests are broad, he has specialized in the Korean War to some extent. He served on active duty in the US Marine Corps for three years, continued in its Reserves, and rose to battalion command and the rank of colonel before he retired. Millett's publications are too numerous to list here, but they include an important history of the US Marine Corps and his highly regarded *For the Common*

Defense: A Military History of the United States of America. *War to be Won: Fighting the Second World War* is another recent and well-received work that he coauthored with Williamson Murray. Scholars wishing to study the Korean War in exhaustive depth might be especially interested in Millett's "Reader's Guide to the Korean War: A Review-Essay," which appeared in the spring 1995 issue of *Joint Forces Quarterly (JFQ)*. Another notable article on this subject is his "Korea, 1950–1953," chapter 8 in *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling.

Their War for Korea has a general focus and is composed of many well-written vignettes based on Millett's interviews with people in Korea and the United States. It is interesting and done with sympathy for both the Korean people and those Americans who fought in the war. Although not focused on airpower, some of the vignettes about airmen may be especially interesting to the readers of *Air and Space Power Journal*, but that may not be enough to cause those with limited reading time to tarry with this work.

One of Millett's most interesting tales has to do with North Korean MiG pilot No Kum-Sok. Lieutenant No was from a Christian family in North Korea, and his father had worked in the electrical industry for the Japanese during the interwar period. By lying about his heritage, he bypassed those personal relationships that the communist government would view as a severe handicap and was admitted to the naval academy. But the UN had pretty well destroyed both the North Korean navy and air force, when a number of midshipmen were tested and dragged out of the academy for training as MiG pilots. In spite of a good deal of attrition, Lieutenant No made it through training and flew more than 100 combat missions in the MiG-15 against increasingly bad odds. According to him, for all the MiG's advantage in ceiling and climb rate, it was a pretty shabby piece of equipment. The airplane had a poor gunsight and did not have a radar or G suit capability. Its T-tail blocked the pilot's view to the rear and above. Many of his colleagues did not make it through training—some were executed because of a lack of political correctness or other perceived defects in their attitude.[47]

In July 1953, after the armistice, No claims that he learned that he was being investigated for political unreliability and chose to fly his aircraft to South Korea. He landed—against traffic—at Kimpo Airfield and received an award of $100,000 from the United States for the delivery of an intact MiG-15. No claimed he knew nothing of the reward before he landed. The airplane lives on in the Museum at Wright-Patterson AFB, and No lived happily ever after in the United States under the name of Kenneth Rowe.

Another of Millett's flying vignettes had special meaning for me. In the early 1950s, Col Dean Hess was the Air Force representative at the US Naval Academy. I can confirm Millett's description of the man's intensity and persuasiveness. I well remember Hess's penetrating light blue eyes and his eloquence in describing the life in the air, and I quite understood his power in his original vocation as a clergyman. He must have been good at that. Two hundred and thirty midshipmen of the Class of 1953 chose to enter the Air Force, and many did not need much persuasion. Hess took his job seriously; his door was always open to the naval midshipmen, and he told one heck of a good war story.

A few years later, as Millett reminds us, Hollywood released *Battle Hymn*, a motion picture starring Rock Hudson as Dean Hess. Hess explains in *Their War* that he would have been more comfortable with the late Gregory Peck playing his character, but the film was a hit for those of us who had met the real Hess at Annapolis. Hess now declares that the idealism expressed in the film was somewhat exaggerated, and although he may have hit an orphanage as depicted in the film, he did not know it. He had flown CAS missions in World War II as a P-47 pilot and knew that collateral damage was a practical certainty but admitted that it still weighed heavily on him when, after the fact, he discovered that he had hit a civilian. During the Korean War, he also remembers being directed by a forward air controller to

attack a target thought to be military but which turned out to be noncombatant.

Hess left the service after World War II but, like Foster, was recalled in 1948 in time for the Korean War. He was tasked to train experienced Korean pilots in the F-51, and, although the job was challenging, he was an effective instructor. After the Chinese entered the war and were driving south, a horde of Korean orphans—who had been created by the war—were being driven along in advance of the communist armies with nowhere to hide and no one to take care of them. As depicted in the film, Hess started an orphanage on an island off the Korean coast and was able to get sustained support for it, due in part to his visibility with senior Air Force leaders through his training and combat activities. Now in his eighties, he continues to visit Korea periodically and otherwise leads a quiet life in Ohio. He still maintains contact with many of his orphans, some of whom have indeed prospered.

Capt Donald D. Bolt was much less famous than either Foster or Hess. Like Foster, he had graduated from flying school at the end of World War II, but unlike Foster, Bolt was not a confident or natural pilot. He was released from active duty and went back to the University of Maryland to finish his degree in architectural engineering. Back in the service for Korea, he volunteered for jet training in the F-80. But when he arrived in the Far East, he was assigned to fly the CAS mission in the F-51 Mustang. His piloting skills were unspectacular, and he still had only limited confidence. Nevertheless, he soldiered on in one of the most dangerous missions. His first shootdown was close to friendly troops, and after a traumatic rescue, he got back in the saddle and was assigned a ground-attack mission near Pyongyang. By then the Inchon landing was in the past, and the UN armies were marching northward. While attacking targets near Pyongyang, he took a hit in his F-51 engine's notoriously vulnerable liquid-cooling system. He landed in a rice paddy and was immediately threatened by some North Koreans at the edge of the paddy who were beginning to advance toward his wreckage. His wingman circled above, making firing passes between the wreckage and the North Koreans to keep them at bay but carefully avoiding hitting the North Koreans for fear that they would execute Bolt it they captured him. His wingman was relieved as he ran low on fuel by another F-51, and those relays of F-51s continued as long as the daylight lasted. As the light faded, the last one departed with Bolt sitting dejectedly on his wing. Sadly, Bolt was never heard from again.[48]

Millett's book is full of vignettes of others, like Foster and Hess, more decorated and famous than Bolt but perhaps none more heroic. These are mostly about people who participated on the ground, but all are interesting and engagingly written. In the *JFQ* article cited above, Millett points out that the power of organized Christianity in Korea was left out of one of the books—I suspect that has been the general tendency. He does show some of its impact in many of his vignettes, but it is hard for the reader to judge just how much that power influenced the course of events. Millett includes appendices that may not be necessary to the work, and there are many other reference tomes that would be a better choice for facts and figures than his book. Although several of the other works on our sampler would take a higher place on a reading list designed to further one's professional development as an air strategist, *Their War* might be useful to an air warrior-scholar if that person is pursuing short, colorful pictures of the Korean War or is just interested in recreational reading.

23 June 1951: Soviet Cease-Fire Proposal

The war had reached a near stalemate by the spring of 1951 and was getting more expensive for both sides. It was clear that President Truman had no intention of advancing north again or allowing things to escalate to *general war*. The Chinese had suffered enormous losses—men and resources—and needed to consolidate their gains in their

own country after achieving a great victory over Chiang Kai-shek's nationalists. The conclusion of the NATO Treaty doubtless persuaded the Soviets that their Berlin blockade had backfired and that the costs of the Korean stalemate were heavy burdens. In addition, the Korean conflict also caused NATO to put some real military muscle behind that treaty. It established greater in-theater force levels that would be complemented, when necessary, by the deployment to Europe of considerable American air and ground forces. The Air Force also created a joint operations center in Korea, and while it never exercised control, it did serve to coordinate the airpower efforts and to improve the effectiveness of the various services. The stalemate reduced CAS requirements and made a substantial amount of UN airpower available to roam at will over North Korea—imposing greater costs and casualties on the enemy, notwithstanding the latter's improved techniques for protecting his moving units and supply convoys. Jon Halliday has argued that the North Koreans lost about one-third of their adult male population, and the Chinese communists were using about half their national budget on the war and lost around a million people during the fighting.[49]

The original vote for UN intervention had been made possible by the Soviets temporally vacating their seat on the Security Council to protest the decision to seat the Nationalist Chinese, rather than the communist, representative. However, the Soviet member had returned and proposed a cease-fire in the summer of 1951. Both sides quickly agreed to begin negotiations in Korea, but those dragged on for two long years with little progress.

27 July 1953: Korean War Armistice

As Paschall argued, the United States paid a great price for principle when it would not agree to force North Korean POWs to return home. On 25 March 1953, LCpl Abner S. Black—my cousin and schoolmate—paid part of that cost when he died on Porkchop Hill while diplomats parried with each other over the repatriation issue. He was but one of our 55,000 human treasures lost in the war.

President Eisenhower took office, and Joseph Stalin died that spring. The former implied that he would use nuclear weapons if a settlement were not made. A power struggle within the USSR was in its genesis. Rhee opened the gates to some of his POW camps, and that issue was overtaken by events. The Korean Truce was concluded on 27 July 1953, and it has been sustained for a half century. The USSR followed a conservative foreign policy ever afterwards, avoiding direct confrontation with the armed forces of the United States. America, for her part, did not respond with force to the 1950s' uprisings in East Germany, Czechoslovakia, or Hungary, notwithstanding the election campaign hype about "Rolling Back the Iron Curtain." A nuclear weapon has not been detonated in anger for 58 years. It behooves the air warrior-scholar to pursue his or her professional reading program on this and other wars. The costs of a faulty strategy can be enormous; the rewards of a good one can be great—survival can depend upon them. □

A 12-Book Sampler on the Air War in Korea**

Two for the Overview

The United States Air Force in Korea, 1950–1953 by Robert F. Futrell. Washington, D.C.: Government Printing Office, 1996.
This is the most definitive work on the air war, written by the dean of USAF historians and from an Air Force perspective. It is comprehensive, so allow a good bit of time to go through it.

The Naval Air War in Korea by Richard P. Hallion. Baltimore, Md.: Nautical and Aviation, 1986.
The former Air Force historian has produced one of the few and very readable books that are focused on the naval air aspects of the air war.

Ten for Depth

The Korean War: An International History by William Stueck. Princeton, N.J.: Princeton University Press, 1997.
This work, by a University of Georgia author, concentrates on the complicated political context in which the war was fought.

Crimson Sky: The Air Battle for Korea by John R. Bruning Jr. Dulles, Va: Brassey's, 2000.
A sound and recent general treatment that examines the operational and tactical levels of the war. Bruning's book is both readable and compact.

Red Wings over the Yalu: China, the Soviet Union, and the Air War in Korea by Xiaoming Zhang. College Station, Tex.: Texas A&M University Press, 2002.
This author's father was in the PRC air force during the Korean War. Zhang, the son, earned his PhD at the University of Iowa and has served as a member of the US Air Force Air War College faculty.

The History of the Office of the Secretary of Defense. Vol. 2, *The Test of War, 1950–1953* by Doris M. Condit. Washington, D.C.: Office of the Secretary of Defense, 1988.
Condit provides the official history, which gives a comprehensive view of the war from the military-strategy level.

Hoyt S. Vandenberg: The Life of a General by Phillip S. Meilinger. Bloomington, Ind.: Indiana University Press, 1989.
This biography of the chief of staff of the Air Force during the Korean War was written by a serving Air Force officer.

The Korean War by Matthew B. Ridgway. Garden City, N.Y.: Doubleday, 1967.
Although General Ridgway, the theater commander, had made his reputation as a paratrooper in Europe in World War II, he was not a big fan of airpower. This primary source reflects that point of view.

**As with our previous fodder articles, this sampler does not aspire to be a definitive bibliography, but only a starter list of available and readable works.

The Sea War in Korea by Malcolm W. Cagle and Frank A. Manson. Annapolis, Md.: United States Naval Institute, 1957.
The authors are an articulate pair of Korean War veterans. Cagle, an aviator, rose to flag rank. Although the book was published 46 years ago, it remains valid.

American Airpower Strategy in Korea, 1950–1953 by Conrad C. Crane. Lawrence, Kans.: University Press of Kansas, 2000.
This is one of the few works focused on the operational-strategy level of the air war. It was authored by a retired Army lieutenant colonel who taught at West Point and at the Army War College.

The Three Wars of Lieutenant General George E. Stratemeyer: His Korean War Diary edited by William T. Y'Blood. Washington, D.C.: Air Force History and Museums Program, 1999.
This diary and others have the advantage of recording primary-source matter while memories are fresh; time has not caused them to mellow and improve the truth. Stratemeyer was MacArthur's airman—the commander of the FEAF for the first year of the war.

Down in the Weeds: Close Air Support in Korea by William T. Y'Blood. Washington, D.C.: Air Force History Support Office, 2002.
Authored by a member of the Air Force History and Museums Program, this pamphlet deals with CAS, one of the most important issues of the Korean air war.

One for Good Measure

Dog Company Six by Edwin Howard Simmons. Annapolis, Md.: Naval Institute Press, 2000.
Sometimes, a work of fiction can be a higher form of truth than many histories—perhaps this is one of those. It is authored by a Marine general with combat experience in Korea. As one of the Corps's former historians, he writes with a sure hand and an engaging style. The book rings true and deserves a place on your reading list.

Notes

1. Rod Paschall, *Witness to War: Korea* (New York: Perigee Books, 1995).

2. This is a view shared by David Halberstam, "This Is Korea, Fifty Years Later," *AARP: The Magazine*, July–August 2003, 86.

3. William Stueck, *The Korean War: An International History* (Princeton, N.J.: Princeton University Press, 1997).

4. Robert D. Schulzinger, *U.S. Diplomacy since 1900*, 5th ed. (New York: Oxford University Press, 2002), 222–24.

5. Walter LaFeber, *America, Russia, and the Cold War, 1945–1966* (New York: Wiley, 1967), 75–80; and Dean Acheson, *The Korean War* (New York: Norton, 1971), 13–14.

6. LaFeber, 88–89; and Lester H. B. Rune, "Recent Scholarship and Findings about the Korean War," *American Studies International* 36 (October 1998): 8, on-line, Internet, 23 July 2003, available from http://www.gwu.edu/-asi/articles/36-3-1.pdf.

7. Max Hastings, *The Korean War* (New York: Simon & Schuster, 1987), 50–51; and Schulzinger, 214.

8. Stetson Conn, ed., *United States Army in the Korean War*, vol. 2, *Truce Tent and Fighting Front* by Walter G. Hermes (1966; reprint, Washington, D.C.: Center of Military History, United States Army, 1992), 8, on-line, Internet, 8 October 2003, available from http://www.army.mil/cmh-pg/books/korea/truce/fm.htm.

9. Hastings, 52–54.

10. George E. Stratemeyer, *The Three Wars of Lt Gen George E. Stratemeyer: His Korean War Diary*, ed. William T. Y'Blood (Washington, D.C.: Air Force History and Museums Program, 1999), 34–35; Thomas C. Hone, "Korea," in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, D.C.: Center for Air Force History, 1999), 454–55; and Allan Millett, "Korea, 1950–1953," in *Case Studies in the Development of Close Air Support*, ed. Benjamin F. Cooling (Washington, D.C.: Office of Air Force History, 1990), 362–63.

11. Malcolm W. Cagle and Frank A. Manson, *The Sea War in Korea* (Annapolis, Md.: United States Naval Institute, 1957), 47–74.

12. Steven J. Zaloga, "The Russians in MiG Alley," *Air Force Magazine* 74, no. 2 (February 1991): 74.

13. Cagle and Manson, 50; and Cmdr Peter B. Mersky, USNR, retired, "Marine Aviation in Korea, 1950–1953," *Naval Aviation News*, September–October 2002, 32. The USS *Badoeng Strait* and the USS *Sicily* were the two escort carriers. John S. Thach, the famous Navy World War II ace, was the skipper of the latter. Neither carrier was capable of operating jets and carried only propeller-driven aircraft.

14. Maurice Matloff, ed., *American Military History* (1969; reprint, partially revised, Washington, D.C.: Office of the Chief of Military History, 1973), 553.

15. Hermes, 10; and Xiaoming Zhang, *Red Wings over the Yalu* (College Station, Tex.: Texas A & M University Press, 2002), 284.

16. Geoffrey Perret, *Old Soldiers Never Die* (New York: Random House, 1996), 547.

17. Matloff, 554.

18. H. Pat Tomlinson, "Inchon: The General's Decision," in *MacArthur and the American Century: A Reader*, ed. William M. Leary (Lincoln, Nebr.: University of Nebraska Press, 2001), 344–49; D. Clayton James, *Refighting the Last War: Command and Crisis in Korea, 1950–1953* (New York: Free Press, 1993), 165–72; and Perret, 548.

19. Richard Whelan, *Drawing the Line: The Korean War, 1950–1953* (Boston, Mass.: Little, Brown, 1990), 189–90; and Robert Frank Futrell, *The United States Air Force in Korea, 1950–1953* (1961; new imprint, Washington, D.C.: Office of Air Force History, 1983), 148.

20. Futrell, 147–51.

21. Ibid., 152–56.

22. Fact Sheet: "Operation Chromite—The Inchon Landing," official, public-access Web site for the Department of Defense commemoration of the 50th Anniversary of the Korean War, on-line, Internet, 8 October 2003, available from http://www.korea50.mil/history/factsheets/chromite.shtml. This Web site states that the whole invasion force had a total of 20 killed, one missing in action, and 174 wounded.

23. James, 173–74; and Futrell, 157–61.

24. Cagle and Manson, 104–5; and Michael Lewis, "Lieutenant General Ned Almond, USA: A Ground Commander's Conflicting View with Airmen over CAS Doctrine and Employment" (master's thesis, School of Advanced Air and Space Studies, 1996).

25. Zaloga, 74. Two weeks after the Inchon landing, Mao received and quickly agreed to a request from Kim Il Sung for Chinese intervention.

26. Jon Halliday, "Air Operations in Korea: The Soviet Side of the Story," in *A Revolutionary War: Korea and the Transformation of the Post War World*, ed. William J. Williams (Chicago: Imprint Publications, 1993), 151.

27. Zhang, 7.

28. Whelan, 307–13.

29. Although the relief of MacArthur is a favored subject for many academics, it is only indirectly related to the air war in Korea. The general seemed to be working on a strategic air strike across the Yalu, and the president was concerned that escalation could lead to World War III. Those wishing to explore the issue further could start with John Spanier's readable book *The Truman-MacArthur Controversy and the Korean War* (Cambridge, Mass.: Belknap, 1959), or Geoffrey Perret's *Old Soldiers Never Die: The Life of Douglas MacArthur* (New York: Random House, 1996), chaps. 31–32.

30. Air mobility during the Korean War is the subject of several books. William M. Leary, *Anything, Anywhere, Any time: Combat Cargo in the Korean War* (Washington, D.C.: Air Force History and Museums Program, 2000), provides a reliable short summary, while Charles Miller, *Airlift Doctrine* (Maxwell AFB, Ala.: Air University Press, 1988), is less reliable. Although Futrell covers air mobility, it is not his focus. Lt Gen William Tunner, *Over the Hump* (1964; reprint, Washington, D.C.: Office of Air Force History, 1985), 225–64, is devoted to the Korean airlift, albeit with some chest thumping.

31. Zhang, 284. MiG-15s arrived in Korea at the same time as the Chinese intervention—but initially, all were piloted by Russians. After training, the Chinese communists committed their first MiG-15s to combat against UN forces in September 1951.

32. Prior to these events, it had not been known that technology transfers, in the form of nuclear espionage and commercial sales, had benefited the Soviets. The espionage had advanced the development and testing of their first atomic weapon, while the purchase of a British jet engine and its subsequent reverse engineering and production provided reliable engines for the MiG-15.

33. Cecil G. Foster, *MiG Alley to Mu Ghia Pass: Memoirs of a Korean War Ace* (Jefferson, N.C.: McFarland & Company, 2001).

34. Ibid, 46. Even at this late date, the kill ratio has varied widely, from a high of 13:1 down to 2:1 in our records and just the opposite in the communist literature. My guess, given the poor training and lack of experience of the Korean, Chinese, and some Russian pilots, is that the ratio might have been around 7:1 in the UN favor. The effects cannot be denied, whatever the true figure, because the UN clearly enjoyed air superiority through most of Korea for the entire war.

35. William T. Y'Blood, *Mig Alley* (Washington, D.C.: Air Force History and Museums Program, 2000), 46–47; and Mersky, 36. Several Marine and Navy pilots served in exchange tours with the Air Force in Korea and got kills while flying the F-86. Lt Col John F. Bolt, USMC, earned ace status with 6.5 kills to his credit. John Glenn, another famous marine, flew the F-86 and was credited with three MiG kills before going into the space program, where he became the first American astronaut to orbit Earth. He later served in the US Senate.

36. Futrell.

37. Zaloga, 75. Col Ivan Kochedub, the top-ranking Soviet ace from World War II (68 kills), was dispatched to the scene but, because of his prominence, was prohibited from actually engaging in air combat.

38. Ibid., 284.

39. Bob Bergin, "Chinese MiG Ace over Korea," *Military History* 18, no. 5 (December, 2001). Lt Gen Han Decai, a PRC Korean War ace, reported that at age 15 he was a farm laborer with only one year of schooling. His fifth kill—the one that made him an ace—was Hal Fischer. See Foster, 59.

40. Zaloga, 77.

41. Rune, 11, 13.

42. Conrad C. Crane, *American Airpower Strategy in Korea, 1950–1953* (Lawrence, Kans.: University Press of Kansas, 2000).

43. Crane, 169; and Zaloga, 76.

44. Eduard Mark, *Aerial Interdiction: Air Power and the Land Battle in Three American Wars* (Washington, D.C.: Center for Air Force History, 1994), 317–19; Millett, 396–99; James A. Winnefeld, *Joint Air Operations: Pursuit of Unity in Command and Control, 1942–1991* (Annapolis, Md.: Naval Institute, 1993), 62; and Federation of American Scientists, "A-10/OA-10 Thunderbolt II," on-line, Internet, 6 October 2003, available from http://www.fas.org/man/dod-101/sys/ac/a-10.htm.

45. Hastings, 255; and William T. Y'Blood, *Down in the Weeds: Close Air Support in Korea* (Washington, D.C.: Air Force History and Museums Program, 2002), 16, 18.

46. Allan R. Millett, *Their War for Korea: American, Asian, and European Combatants and Civilians, 1945–1953* (Dulles, Va.: Brassey's, 2002).

47. Bergin. Chinese lieutenant general Han Decai seems to agree with Lt No when he cites the F-86 as the best fighter in the world and claims that its .50-caliber armament was better than the cannons on the MiG.

48. Forrest L. Marion, "Sabre Pilot Pickup: Unconventional Contributions to Air Superiority in Korea," *Air Power History* 49, no. 1 (spring 2002): 24. Bolt was 84 miles into enemy territory and beyond the reach of rescue at that time. Later in the war, helicopter rescue became increasingly effective and important. By example, Capt Joseph C. McConnell, USAF, was downed after his eighth kill, rescued by an H-19, and returned to operations. He then went on to shoot down eight more enemy aircraft, which brought his total to 16 and earned him the distinction of being the war's leading ace.

49. Halliday, 158, 168 n. 64, 65.

Gen Curtis Emerson LeMay
Father of Strategic Air Command

ASPJ STAFF*

Born in Ohio in 1906, Curtis LeMay saw his first airplane in flight at the age of four or five and became so excited that he tried to run after it. After graduating from Ohio State University, he entered the service as a flying cadet, earned his wings at Kelly Field, Texas, and received his commission as a second lieutenant in October 1929. Through 1937 he served in various pursuit/fighter assignments, transferring that year to bomber aircraft. In 1938 he led the first mass B-17 flight to South America, an aerial feat that won the Mackay Trophy for the 2d Bomb Group. Prior to 7 December 1941, he pioneered air routes over the North Atlantic to England and over the South Atlantic to Africa.

LeMay began World War II as a group commander in the Eighth Air Force, rising in rank within 18 months from lieutenant colonel to major general and becoming commander of an air division. B-17 units used his formation/bombing techniques and tactics, and B-29 units adapted them as standards. He commanded the raid on Regensburg, Germany, and later transferred to the Pacific to command 20th Bomber Command in the China-Burma-India theater. General LeMay became chief of staff of Strategic Air Forces in the Pacific by war's end.

Upon his return to the United States, he served briefly at Headquarters Air Materiel Command and then as first deputy chief of air staff for research and development at the Pentagon. By October of 1947, he was on the move again, commanding US Air Forces in Europe and directing the Berlin airlift.

In 1949 General LeMay replaced Gen George Kenney as commander of the recently formed Strategic Air Command (SAC) and established its headquarters at Offutt

AFB, Nebraska, thus beginning one of the longest and perhaps most difficult chapters of his career. He inherited a command of poorly trained, understaffed, and relatively unorganized World War II B-29 groups, but by applying hard work and an uncompromising standard of excellence, General LeMay built SAC into a modern, all-jet force run by dedicated professionals. He rigorously trained and exercised his men but also campaigned for better pay and housing. Commanding SAC for over 10 years—the longest tenure of any individual—he oversaw the development of midair refueling, the establishment of new bases and units, the implementation of strict command-and-control systems as well as tough operational inspections, and the creation of plans for integrating intercontinental ballistic missiles with strategic airpower.

In 1957 General LeMay left SAC, becoming vice chief of staff of the Air Force that year and chief of staff in 1961; he retired on 1 February 1965. General LeMay died on 3 October 1990 and is buried in the United States Air Force Academy Cemetery at Colorado Springs, Colorado.

To Learn More . . .

Coffey, Thomas M. *Iron Eagle: The Turbulent Life of General Curtis LeMay.* New York: Crown Publishers, 1986.Ä
LeMay, Curtis E., with Dale O. Smith. *America Is in Danger*. New York: Funk & Wagnalls, 1968.Ä
———, with MacKinlay Kantor. *Mission with LeMay: My Story.* Garden City, N.Y.: Doubleday, 1965.Ä
Meilinger, Phillip S. *American Airpower Biography: A Survey of the Field.* Maxwell AFB, Ala.: Air University Press, 1995.Ä
Nutter, Ralph H. *With the Possum and the Eagle: The Memoir of a Navigator's War over Germany and Japan*. Novato, Calif.: Presidio, 2002.Ä

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*This sketch draws on information about General LeMay found in Phillip S. Meilinger's *American Airpower Biography: A Survey of the Field* (Maxwell AFB, Ala.: Air University Press, 1995); and "General Curtis Emerson LeMay," United States Air Force Biography, on-line, Internet, 22 October 2003, available from http://www.af.mil/bios/bio_6178.shtml.

Silent Wings at War: Combat Gliders in World War II
by John L. Lowden. Smithsonian Institution Press (http://www.sipress.si.edu), 750 Ninth Street NW, Suite 4300, Washington, D.C. 20560-0950, 2002, 304 pages, $19.95 (softcover).

In September 1944 Walter Cronkite, then a war correspondent for United Press International in Europe, flew in a US Waco combat glider during Operation Market Garden—a poorly conceived and executed airborne assault on Holland designed to capture three critical bridges leading to the Rhine River. In the foreword to John Lowden's *Silent Wings at War,* Cronkite writes of his first—and only—glider flight: "I'll tell you straight out: If you've got to go into combat, don't go by glider. Walk, crawl, parachute, swim, float—anything. But don't go by glider." His remarks capture the essence of the Allies' use of gliders in combat during World War II—harrowing, dangerous, and costly in terms of equipment and human casualties.

Lowden, one of the heroic glider pilots who managed to survive, chronicles the origins of these aircraft and the use of the American Waco and British Horsa gliders in seven major airborne assaults in World War II. As a second lieutenant, the author served in the 1st Allied Airborne Army in Europe, receiving the Air Medal with Bronze Oak Leaf Cluster, Presidential Unit Citation, Bronze Arrowhead of initial assault troops, and seven unit battle stars. His book blends his personal experience as a pilot with both the history of combat gliders and the accounts of 39 other combat glider veterans. As a result, *Silent Wings at War* is more than just a memoir; it is a fast-paced history of this most dangerous of air missions—one inadequately covered by the historiography of World War II.

Lowden begins with his own history and moves into the beginning of the war. He documents his enlistment in the US Army and his training as a glider pilot; provides a vivid picture of an aircraft made of steel tubing, plywood, and canvas, loaded with equipment and/or troops, and towed by a C-47; and paints a vivid picture of what it was like to pilot this fragile craft as it glided to what one hoped would be a safe, uneventful landing. In reality, as Lowden relates, the typical glider landing was bumpy—so much so that the aircraft was often either damaged or destroyed.

The author then addresses in detail how the Allies employed gliders in combat—including Sicily, Normandy, Holland, and Burma. One gets the impression that the planners of the European operations had great expectations that the gliderborne troops would accomplish their missions but little understanding of the hazards involved. In virtually every one of these operations, "whatever could go wrong, did." For example, British and American naval gunners of the invasion fleet off the coast of Sicily shot up Allied formations flying from North Africa before the tow planes released their gliders. Time and again, pilots of the tow planes broke off too early, enemy ground fire took its toll on the gliders, and many of them failed to find their assigned landing zones. At least 25 percent of the gliders used in each of the three major European glider operations were too severely damaged to be flown again or were destroyed in flight or upon landing.

After I finished reading this book, I wondered, like Walter Cronkite, why anyone in his right mind would fly a glider at all—not to mention repeatedly. Many of them had washed out of pilot training, some volunteered, and others were drafted into glider training. Those like Lowden, who continued to fly gliders, were in a special class—equal to the bravest of the fighter and bomber pilots of World War II. They had the guts to fly an unprotected, unarmored wooden crate to an unknown landing zone, miles into enemy territory—usually at night. The fact that many of them survived multiple operations under these conditions is a testament to

their courage, skill, and sheer luck in what was probably the most hazardous flying mission of World War II.

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Tritium on Ice: The Dangerous New Alliance of Nuclear Weapons and Nuclear Power by Kenneth D. Bergeron. MIT Press (http://www.mitpress.mit.edu), Five Cambridge Center, Cambridge, Massachusetts 02142-1493, 2002, 232 pages, $24.95 (hardcover).

Since the dawn of the nuclear age, the United States has been at the forefront of international efforts to control the spread of nuclear weapons. At a time when concerns about nuclear proliferation are making headlines from Northeast Asia to the Middle East, Kenneth D. Bergeron's new book takes a hard look at a recent policy change within the Department of Energy that departs significantly from the long-standing US practice of handling nuclear materials. The book focuses on a decision made in 1998 by Secretary of Energy Bill Richardson to end the policy of bifurcating civilian and military nuclear operations. The decision merged the production of the hydrogen isotope tritium (a material used only by the military to turn atomic nuclear weapons into hydrogen weapons) with the activities of the historically civilian nuclear plants operated by the Tennessee Valley Authority (TVA).

Bergeron explains how concerns about national security and safety of the facilities have long dictated that civilian and military nuclear operations be conducted separately, criticizing both the decision-making process and the ultimate decision to merge the operations. Much of his book describes how this already bad decision became worse during implementation and notes how the organization and facilities chosen to serve this new dual-role mission are the worst possible choices because of the entrenched bureaucracy at the TVA and because of the age, security, and design of the facilities themselves. According to the author, political and economic factors, intellectually disingenuous science, and the sheer force of bureaucratic inertia tainted and eventually doomed the decision-making process. The book critically details how the individuals who served as secretary of energy in the 1990s used an organization designed to create jobs in the 1930s to circumvent nonproliferation policies dating back to the 1950s.

Tritium on Ice is a must-read for the nonproliferation and energy-policy communities. The topic is timely, the science is palatable, and the clarity of the writing is exceptional. Students of current events will also find the book worthwhile and rewarding.

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Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History by Colin S. Gray. Frank Cass Publishers (http://www.frankcass.com), 5824 NE Hassalo Street, Portland, Oregon 97213-3644, 2002, 310 pages, $52.50 (hardcover).

In his foreword to this text, Williamson Murray lays bare one of the central problems in today's academic studies—the gap between political scientists and historians in their dealings with strategy, war, and military institutions. One group studies war only as a period set piece, while the other—I am willing to theorize—uses preestablished formulas. Colin Gray is one of the leading neo-Clausewitzian theorists who believes that, although warfare has changed, war—as long as humans wage it—has not. He uses three historical case studies—Napoléon, World War I, and nuclear war—to explore revolutions in military affairs (RMA) and their effect on war. The possibility of revolutionary change in warfare first appeared in Soviet military writings when, by the late 1970s, the Soviet General Staff realized that American and Western technological innovations would make the USSR's weapons, doctrine, and tactics obsolete. The writings of Marshal Nikolai Ogarkov stressed the RMA in the "reconnaissance strike complexes" being developed by the United States. In conjunction with these developments, the nonlinearity of events—or the fog of war, as Clausewitz refers to it—made a comeback in the form of chaos theory. According to Gray, the problem lies in determining how much of this transformation is technology-based and how much is driven by humans.

Strategy for Chaos is the first book that examines all elements—history, strategy, and policy making—in laying out what the RMA is and when one achieves it. The most dramatic conclusion, one that most military officers will recognize, is that change always brings about a reaction by the enemy or competitor. (Yes, even the sole remaining superpower in the world has competitors.) Equally important is the strategic framework that Gray uses to relate the RMA to the world. In his

examination of RMA theories, Gray argues against the waves of historical transformation sweeping the world. RMA life cycles come in nine steps: preparation, recognition of the challenge, parentage, enabling spark, strategic moment, institutional agency, instrument, execution and evolving maturity, and, finally, feedback and adjustment. The RMA is a strategic behavior, a theme that the book clearly develops throughout. This is also important since a great many policy makers in Washington, D.C., having focused on the technical promises of the RMA, have overlooked or minimized the effect of strategy on the RMA.

The three case studies speak for themselves, but the chapter on nuclear RMA, with its recent history and strategic analysis, is especially good. The conclusion examines the tensions between the idea of strategy as purposeful direction/plan of action and as a zone of complexity. Strategy and war are technically chaotic in that they do not neatly progress in a linear fashion. Ultimately, to be strategically successful, one needs to be better than one's foe. In the final analysis, the RMA is strategic behavior.

The value of this book lies in its synthesis of past and current strategic thinkers and their concepts, presented against the backdrop of the RMA. Gray has done a great service to both the history and public-policy communities since his strategic analysis demonstrates that the RMA is a vital part of a nation-state's strategic development. The framework for analysis and thinking developed within this text will prove helpful to laymen, military personnel, and policy makers. The bibliography and extensive chapter footnotes allow the reader to follow the logic and reasoning the author used in laying out these arguments. *Strategy for Chaos* is a must-read for any student of strategy, and war colleges would do well to include it in their strategy curriculum.

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Gradual Failure: The Air War over North Vietnam, 1965–1966 by Jacob Van Staaveren. Air Force History and Museums Program (http://www.airforcehistory.hq.af.mil/publications.htm), 200 McChord Street, Box 94, Bolling AFB, Washington, D.C. 20332-1111, 2002, 388 pages, $60.00 (hardcover).

I have a vague recollection of hearing about the early years of the Vietnam War when I was growing up in Madison, Wisconsin. The war was in one of those faraway places, like Chicago or Kansas City—only warmer, and it rained more there. I heard about the first Operation Linebacker years later, as I went through ROTC. At that point, the question of whether Linebacker was a success or failure never made an impression on me. The point my instructors drove home was the intense control exerted by the civilian leadership over military operations. Moving through my Air Force career, I studied further aspects of the first Linebacker as part of my military education and in relation to my various jobs in readiness, weather, and operations. But the best overall coverage I've seen to this date is in *Gradual Failure*.

Clausewitz reminds us that war is an instrument of politicians. Many orders in-theater originated as decisions in headquarters thousands of miles from the front lines—in the Oval Office, operations centers in the Pentagon, or conference rooms in Hawaii or other locations. Van Staaveren effectively captures the thoughts of President Lyndon B. Johnson, Secretary of Defense Robert S. McNamara, Gen Earle G. Wheeler (then the chairman of the Joints Chiefs of Staff), and other prominent leaders and political figures.

The author's discussion of the attacks against North Vietnamese surface-to-air (SAM) missiles in 1966 is particularly striking. He addresses both the initial indecisiveness of American civilian leaders with regard to striking the SAMs and the subsequent limitations they placed on Air Force and Navy aircrews who targeted the missiles. American air planners realized the threat the SAMs represented and made plans to attack them—something that we take for granted today. But Van Staaveren vividly recounts how President Johnson and Secretary McNamara's desire to limit operations, always under the guise of not wanting to draw China or the Soviet Union into the war, stymied the effectiveness of military operations.

Just as Col John Warden emphasized the importance of attacking key industries and supplies in his "five-ring" theory during the first Gulf War, so did air planners identify petroleum, oil, and lubricants (POL) storage centers, cement factories, ports, aircraft-assembly points, and dams as critical targets during early Linebacker operations. Van Staaveren shows time and again that Johnson and McNamara feared that attacking these assets would force an escalation of the war, thus bringing in China and/or the Soviet Union. Eventually, the need to make progress in the war forced the president and secretary to approve selected POL stor-

age points, dams, and other vital targets—but under strict control.

Aside from the control the politicians exercised upon operations in-theater, time and again Van Staaveren brings to the front an overarching international political aspect to Operation Linebacker—the political stability of South Vietnam during this period. His magnificent coverage of this aspect of the war helps the reader more clearly understand how and why limited numbers of South Vietnamese aircrews participated in US raids; why the United States periodically suspended operations either in selected areas or in toto; and why the general American political barometer read as it did when coup after coup unfolded in South Vietnam during this testy period.

Gradual Failure is a must-read for all air and space power history buffs, and air planners will do well to delve into the lessons this air operation has to offer. Furthermore, people who aspire to public office can clearly see in this book the detrimental effects of having Washington call all the shots. The only thing really missing from *Gradual Failure* is an explanation of why the powers that be chose a defensive position as the name of an offensive operation. But that's part of the fog of war.

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Flankers: The New Generation by Yefim Gordon (translated by Dmitriy Komissarov). Specialty Press/Midland Publishing (http://www.specialtypress.com), 39966 Grand Avenue, North Branch, Minnesota 55056, 2002, 128 pages, $27.95 (softcover).

Flankers, the second entry in Midland's Red Star series, is authored by noted Russian aviation writer Yefim Gordon, whose previous works include books on both the history of the Sukhoi design bureau (responsible for the development of the Flanker) and on the Flanker's closest rival: Mikoyan's MiG-29 Fulcrum. Ironically, the reputation earned by the Mikoyan design bureau's fighters during the Cold War made the term *MiG* (derived from *Mi*koyan-*G*urevich) a common euphemism in Western aviation circles for any adversary fighter aircraft. Yet, the culmination of fighter design during the Soviet era came not from this establishment but from the rival Sukhoi bureau. By the early 1980s, Sukhoi's T10-1 prototype, first flown in 1977, was the subject of much scrutiny by Western intelligence agencies, who dubbed it "Flanker A." As the prototype evolved into the Su-27 or "Flanker B" production model, word of its potential as a fighter spread as well. The book's pictures and text drive home the point that this is a big airframe with a large internal fuel load, extensive avionics capacity, and the capability to carry numerous weapons. For all its size, however, the Flanker proved itself agile as well, and Gordon describes a history of aerobatic demonstrations that few aircraft can rival. In combination, these traits showed great promise for the design's adaptability and longevity.

This book is also a testament to the aircraft's potential in that it covers *only* experimental, prototype, and advanced production models beyond the basic design. The author documents experimentation on the airframe dating back to the earliest phases of the program. The bulk of *Flankers*, however, is dedicated to the so-called Su-30 series of aircraft. Beginning with the Su-27M—in effect a concept demonstrator renamed the Su-35—the Flanker has evolved into the Su-30 multirole fighter, the Su-32/34 tactical bomber, and the Su-33 naval variant. Gordon also devotes much effort to describing subtypes intended for foreign sales, such as the Su-30MKI (India) and the Su-30MKK (China).

Numerous photographs, most of them in color, along with colored drawings complement the text, providing information on all prototypes and production models. Close-up photos offer details on key features such as cockpits, thrust-vectored engine nozzles, and weapons and attachment points. (I am not a modeler, but I think that the paint schemes and details thus offered would make this book a valuable reference for the hobbyist.)

Gordon states that the information he presents in *Flankers* comes from both the Russian aviation industry as well as "various" other sources. Unfortunately, he makes no further attempt to identify the latter or qualify judgments for specific claims. For example, Gordon offers performance details on the N-011 pulse-Doppler fire-control radar used in most of the Su-30 series and gives figures for the detection ranges, number of targets it can track or engage, and so forth. Is this information derived solely from the manufacturer's data, or has it been validated or assessed by others? The reader is left to wonder.

Despite such concerns, Gordon offers us valuable information and insight into a family of aircraft that already competes with US aircraft in the export market and that might someday oppose our planes in combat. Anyone interested in the future

of the Flanker and its potential impact on the Russian air force and other foreign air arms will want to read this book.

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Out of the Italian Night: Wellington Bomber Operations, 1944–45 by Maurice G. Lihou. Crowood Press/Airlife Publishing (http://www.crowoodpress.co.uk/780/index.asp), The Stable Block, Crowood Lane, Ramsbury, Wiltshire, United Kingdom SN8 2HR, 2003, 208 pages, $16.95 (softcover).

Bombers over Berlin: The RAF Offensive, November 1943–March 1944 by Alan W. Cooper. Crowood Press/Airlife Publishing, 2003, 320 pages, $19.95 (softcover).

Although the American air effort in World War II is fairly well known to those of us "on this side of the pond," we have less appreciation for the British night operations. Maurice Lihou's *Out of the Italian Night* and Alan Cooper's *Bombers over Berlin*, however, go a long way towards erasing that deficit. Although both books have been published in Britain, these 2003 printings by Airlife make them available in the United States for the first time.

As World War II recedes into the past and veterans of that conflict pass away, memoirs like *Out of the Italian Night* become even more valuable. Choosing to tell his story in third person, Lihou doesn't sugarcoat his actions or emotions. For instance, although he hoped to hit the cities he was tasked to bomb, the nature of technology and the inaccuracy of attacking at night inevitably led to civilian casualties. He juxtaposes his worry over hurting civilians with the absolute thrill he felt in combat, reveling in the excitement and danger of flying over hostile territory while subject to enemy flak and attacks from night fighters. British units encountered these problems and others as well—midair collisions and difficulties with nighttime navigation, for example.

Lihou begins his narrative with the departure flight from England to North Africa and proceeds chronologically until late in the war, when malaria strikes him down. Stuck in the hospital in Italy while his crew rotates home, the author uses this pause in the narrative to flash back to his training days in Canada—a brilliant technique that makes reading the book very enjoyable.

Alan Cooper's *Bombers over Berlin*, which utilizes a more distanced view than does *Out of the Italian Night*, describes all 16 raids launched by the Royal Air Force's Bomber Command in the Battle of Berlin between November 1943 and the following March. Unlike Lihou, who managed to evade the dangers he faced in Italy, the pilots flying the Lancaster bombers from Britain fell victim to midair collisions, flak, mechanical failures, and German night fighters in an offensive that ultimately cost nearly 600 aircraft and 4,000 airmen. Cooper details each mission from the perspective of a few crews that returned and a few that did not.

Bombers over Berlin is among the best combat narratives available. The book's only possible shortcoming is its tendency to remain detached from the larger aspects of aerial warfare. For instance, Cooper's method of judging each raid's effectiveness according to the tons of bombs dropped per aircraft lost seems a poor indicator of whether or not one is winning the war. Although he does list the number of people rendered homeless and factories damaged, he fails to place these effects in the larger context of their impact on the German war effort. Cooper also terms the offensive a success even though many accounts judge it a failure. These criticisms aside, *Out of the Italian Night* and *Bombers over Berlin* provide valuable insight into Great Britain's effort in the Combined Bomber Offensive and, therefore, are well worth reading.

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Disobedience and Conspiracy in the German Army, 1918–1945 by Robert B. Kane. McFarland and Company, Inc., Publishers (http://www.mcfarlandpub.com), Box 611, Jefferson, North Carolina 28640, 2002, 279 pages, $45.00.

Robert Kane seeks to discover why a few German officers chose disobedience over blind obedience in conspiring against Hitler and the Nazi regime. What set these officers apart from their compatriots? Why had so few joined Ludwig Beck, Claus von Stauffenberg, and the military opposition? For Kane, one of the major answers to these questions lies in the "origins, consequences, and significance of the personal oath of loyalty" (p. 1) that German military members swore to the führer. Dividing the

German military into Hitler followers (true believers, idolizers, and careerists), nonconspirators (those critical of Hitler but unwilling to take action), and conspirators, Kane contends that the oath was more than mere words in that it prevented many people from becoming active conspirators.

Kane commences his investigation into the significance of the Hitler oath by discussing the origins and meaning of military oaths from prehistory to the Wilhelmine era. After offering a brief introduction to those theories of moral development that inform his analysis, Kane turns to examining the interplay between oaths, loyalty, and the German state from 1918 through the Second World War. His final chapters provide a brief survey of the military opposition to Hitler, followed by an analysis of those factors that persuaded a few members of the military to break their oaths of loyalty to him. Kane concludes that the military opposition shared three common characteristics: a nurturing childhood, spiritual home life, and humanistic education. Although "none of these factors individually can explain why some officers chose conspiracy and others did not" (p. 211), the combination of them produced a moral and ethical value system that empowered these men to question the morality of blind, unthinking obedience.

This study is problematic at a number of levels. The starting premise of the book—that the oath of loyalty rendered to Hitler by German soldiers prevented many of them from joining the active opposition—is questionable. A number of officers who hid behind their oaths of loyalty to Hitler had earlier circumvented or ignored oaths of loyalty to the Weimar constitution, and several later felt free to lie under oath before the Nuremberg tribunal. Kane acknowledges that German officers never internalized their oath to the Weimar constitution yet fails to recognize the logical implication: the key question is not why a few soldiers proved willing to violate their oath to Hitler but why so many remained committed to the regime even as defeat stared them in the eyes. Exploring and acknowledging the appeal of Hitler's military buildup and foreign-policy successes during the 1930s, the growing influence of Nazi ideology among the junior officer corps, and Hitler's use of bribery to co-opt senior generals, Kane contends that the oath of loyalty played a very important role in limiting active opposition to Hitler. This reviewer endorses a simpler explanation: military opposition to the führer was limited because few individuals actually opposed his leadership. The oath played a minor role.

Secondly, Kane's conclusion needs elaboration and development. Given that a number of Hitler loyalists (such as Karl Dönitz) and nonconspirators (such as Erich Raeder) had experienced nurturing childhoods, spiritual home lives, and humanistic educations, why did they stay true to the führer while Beck, Stauffenberg, and associates concluded that resistance was a moral imperative? More importantly, did other military resisters such as those associated with the Red Orchestra or those who deserted to join Germany's enemies share these traits? Kane's thesis may apply to the nationalist-conservative military resistance, but one must question whether it applies to others who opposed the Hitler regime, such as trade unionists, communists, and groups such as the Edelweiss Piraten.

Disobedience and Conspiracy, based overwhelmingly on published English-language sources, overlooks many of the debates and recent publications that might inform its analysis. Kane's brief comments on Hitler's bribery of the senior officer corps, for example, fail to draw upon Gerd Ueberschär and Winfried Vogel's *Dienen und Verdienen: Hitlers Geschenke an seine Eliten* (Service and reward: Hitler's gifts to his elite) (Frankfurt/Main: S. Fischer Verlag, 1999), or Norman Goda's "Black Marks: Hitler's Bribery of His Senior Officers during World War II," *The Journal of Modern History*, June 2000, 413–52. Uebershär, Vogel, and Goda show that numerous officers (Erich von Manstein, Gerd von Rundstedt, Gunther von Kluge, and Hans Guderian, to name a few) who later claimed that their sense of duty and honor had precluded their joining the anti-Hitler conspiracy accepted large, covert monetary gifts from the führer. Pleas of honor and duty ring hollow when corruption is their handmaiden. Likewise, Kane's discussion of the Wehrmacht's responsibility for war crimes overlooks material generated by the controversial Wehrmacht exhibit that toured Germany and Austria throughout the 1990s (see, for example, Hannes Heer and Klaus Naumann, eds., *War of Extermination: The German Military in World War II, 1941–1944* [New York: Berghahn Books, 2000]). Lastly, Kane's narrow focus on figures associated with the assassination attempt of 20 July 1944 overlooks recent historiography on military resistance in the Third Reich, in which a younger generation has turned to examining the resistance of the "little man"—desertion.

Despite these drawbacks, *Disobedience and Conspiracy* has its merits. Kane scrutinizes the dynamics of oath giving in far greater depth than do the leading historians of the military opposition to

Hitler (Peter Hoffmann, Klemens von Klemperer, and Theodore Hamerow), appending his study with an overview of oaths sworn to the Prussian king and Weimar constitution, and oaths given to Hitler by the military, Hitler Youth, SA, and SS. Spanning the period from Germany's defeat in the First World War through the aftermath of the attempt on Hitler's life, Kane's study conveys a firm sense of the historic context to the issue he examines. Furthermore, the author provides a valuable service by integrating perspectives from the disciplines of philosophy and psychology into his analysis: his introductory discussion of obedience and disobedience is most commendable. Though flawed, the study adds a fair discussion to the English-language literature on the topic and will appeal to readers seeking a detailed if controversial examination of the origins, significance, and impact of the Hitler oath.

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Protecting the American Homeland: A Preliminary Analysis by Michael E. O'Hanlon et al. Brookings Institution Press (http://www.brook.edu/press/press_hp.htm), 1775 Massachusetts Avenue NW, Washington, D.C. 20036-2188, 2002, 188 pages, $17.95 (softcover).

In the aftermath of the terrorist attacks of 11 September 2001, many books have appeared, purporting to tell the story. Some are personal accounts meant to inspire; some are pictorials meant to chronicle the day; and almost all are insignificant. *Protecting the American Homeland,* however, is different. Produced by scholars at the Brookings Institution, it offers an analysis of what needs to be done to prevent similar incidents from occurring in the future. Despite the authors' admission that their analysis is preliminary, the discussion is both important and worthwhile. Also acknowledging that the book is neither a battle plan for the defeat of terrorism nor a political analysis, they target four areas: (1) perimeter defense, including ideas for strengthening US defenses and fixing the responsibility of pertinent agencies; (2) detection of potential terrorists in the United States and protection of hazardous materials they might use; (3) identification of key sites by criticality and expenditure of limited resources on them rather than attempting to provide total protection; and (4) consequence management.

O'Hanlon and his coauthors compare their proposals to the program offered by President George W. Bush. They have no quarrel with the president but feel that his ideas do not go far enough, suggesting additional expenditures that would raise the bill from $38 billion to $45 billion annually. Their proposals broaden the focus of homeland defense and frame the discussion as we struggle with the weighty issues before us.

Protecting the American Homeland establishes a good foundation for understanding the challenges that lie before us. Military, political, and business leaders throughout our nation should read it.

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Six Days of War: June 1967 and the Making of the Modern Middle East by Michael B. Oren. Oxford University Press (http://www.oup-usa.org), 198 Madison Avenue, New York, New York 10016, 2002, 480 pages, $30.00.

Michael Oren has written what will undoubtedly be a required text on the Arab-Israeli wars in general and the Six-Day War of 1967 in particular. Many people think of the latter conflict in terms of the lightning air strike the Israelis conducted as an opening gambit to the tense situation in the Middle East. Oren takes readers beyond this perspective and into the pressures on the Egyptian, Jordanian, and Israeli sides regarding making a decision to engage in war. He devotes one chapter to each day of the struggle, from 5 to 10 June 1967, describing the tactics, counterstrikes, and troop exhaustion on all three fronts. The author also pieces together the political conditions that led to Israel's spectacular victory. Unlike many Israeli writers who focus on Israel's triumph, he delves into the competence of the Jordanian Arab Legion and the aftermath of the victory on Arab psychology, which contributed to a coordinated surprise attack on Israel by Egypt and Syria on 6 October 1973—the beginning of the Yom Kippur War.

Part of the book reveals the strange relationship between Egyptian president Gamal Abdel Nasser and Abd al-Hakim Amer, his commander in chief. Egypt's strongman tolerated Amer's corruption, overlooked his dismal performance in the Yemen War (1962–67), and refused to acknowledge how he had ruined the union between Syria and Egypt. Amer had run the Egyptian armed forces as his personal fiefdom, appointing officers not on the

basis of military competence but on their entertainment value and loyalty to him. The result was an officer corps distant from the troops it commanded. One of the keys to Israeli success lay in Amer's indecisiveness on the eve of battle, issuing counterorders and completely ignoring battle plans drawn up by the general chiefs of staff. Nasser and his generals placed too much faith in their Soviet arms and not enough in the training, morale, and logistical support of the basic Egyptian fighting soldier.

Oren also delves into the enormous pressure felt by Israeli prime minister Levi Eshkol and his generals, led by Itzhak Rabin and Moshe Dayan, to counter Egyptian and Syrian mobilizations and military bravado. Nasser had expelled United Nations observers from the demilitarized zone imposed by the Suez crisis of 1956, dispatched his navy to blockade the Straits of Tiran, and initiated a program to divert the headwaters of the Jordan River to Israel's disadvantage. This very readable book has my highest recommendation.

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Wings, Women, and War: Soviet Airwomen in World War II Combat by Reina Pennington. University Press of Kansas (http://www.kansaspress.ku.edu), 2501 West 15th Street, Lawrence, Kansas 66049-3905, 2002, 312 pages, $29.95.

In some of the many thousands of books—both popular and scholarly—that deal with the history of airpower in World War II, one occasionally encounters mention of Soviet women who served as combat aviators. Fleeting allusions to female fighter aces or the exploits of a night-bomber regiment known as the "Night Witches" occasionally crop up. Recent debates within the US military regarding the role of women in combat have rekindled memories of the US Army Air Forces' use of female pilots during World War II and have brought belated recognition to the surviving veterans of the Women's Auxiliary Ferrying Squadron and the Women Airforce Service Pilots. Yet, no one had attempted a sustained, scholarly examination of the Soviets' use of women pilots. When addressed at all, such employment was dismissed as a Stalinist propaganda device or a temporary measure to address a dire shortage of male pilots after the bloodletting of the summer of 1941. Reina Pennington has tackled this fascinating subject and produced an important book that succeeds on many levels.

She begins the story back in the 1930s, when a wildly air-minded Soviet Union excelled in such aviation feats as record-breaking long-distance flights. Just as Great Britain had Amy Johnson and the United States had Amelia Earhart, so did the USSR have the charismatic and outspoken Marina Raskova. Not only did Raskova lead the charge for the mobilization of women's aviation units, but also her organizational and leadership abilities decisively shaped the initial efforts, often in opposition to mainstream Red Air Force thinking on the subject. Pennington traces the complex web of personalities, influence, popular sentiment, and utilitarianism that led to the creation of Aviation Group 122 shortly after the German invasion of the Soviet Union on 22 June 1941. In the process, she dispenses with the simplistic idea that the women's regiments were mere propaganda devices and demonstrates that, whatever challenges faced the Red Air Force in 1941, lack of male pilots was not one of them.

The core chapters of the book offer detailed examinations of the three combat regiments comprised primarily of female personnel—the 46th Guards Night Bomber Aviation Regiment (the famed Night Witches), the 125th Guards Bomber Aviation Regiment, and the 586th Fighter Aviation Regiment. Models of effective unit history, these chapters include pertinent details of the organization's stand-up, combat activities, successes, and failures, along with particularly keen insights regarding leadership, morale, and the unique challenges faced by the women's regiments. A chapter on the experience of women in primarily male air regiments offers trenchant observations about the challenges of developing and leading integrated units. This chapter also relates the story of Liliia Litviak, the most celebrated of all the Soviet women pilots. Litviak shot down at least 12 Luftwaffe aircraft and was severely wounded in action before she vanished on 1 August 1943 during her fourth combat mission of the day. One of her male colleagues declared that "as a person and as a pilot she was wonderful" (p. 141).

The book is solidly based upon Soviet-era primary sources, including the operational records and combat logs of the three air regiments under examination. The author also was able to interview a number of surviving veterans, including the former commander of the 586th Fighter Aviation Regiment. These candid and often poignant reminiscences add greatly to the effectiveness of the

presentation. Although a few previously published English-language books on Soviet airwomen also relied on interviews, none attempted to integrate critical analysis, primary documentation, and oral testimony. Pennington's work represents a signifi≠ cant advance beyond anything previously pub≠ lished on the subject in English.

In the author's own words, this book lies "at the intersection of Russian history, military history and women's history" (p. 214). In truth, this remarkable work transcends all three genres, having important things to say about Soviet society in the 1930s and 1940s and about the role of women in that society. It also greatly enhances our understanding of com≠ bat conditions and the general nature of aerial warfare on the Eastern Front—a topic still in need of much attention. Although it is not a work of ad≠ vocacy that seeks to influence current and future policy, it is full of implications nonetheless. Nor is it primarily intended as a tribute to the courage and sacrifice of airwomen, although it fulfills this func≠ tion admirably. It is hard not to feel respect for the pilots of the 46th in their obsolete Po-2 biplanes, averaging five to 10 hazardous combat sorties per night while facing official skepticism and neglect.

This book illuminates an almost completely misunderstood chapter in the history of World War II air operations. It underscores the fact that, Soviet propaganda aside, the Great Patriotic War against the Third Reich demanded tremendous sacrifices from every segment of Soviet society. Air Force leaders and students of history alike will find *Wings, Women, and War* valuable reading. Whatever one's beliefs regarding the role of women in aerial combat, this book offers food for thought.

Dr. Richard R. Muller
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U.S. War Plans: 1938–1945 edited by Steven T. Ross. Lynne Rienner Publishers, Inc. (http://www.rienner.com), 1800 30th Street, Suite 314, Boulder, Colorado 80301, 2002, 400 pages, $89.95 (hardcover).

U.S. War Plans: 1938–1945, edited by Steven T. Ross, a Naval War College professor, is part of a larger body of work. He previously published a six-volume study, *American War Plans, 1919–1950*, the first five volumes of which are actually a compila≠ tion of photocopies of US war planning from 1919 to 1941 (the sixth volume is Ross's own history of post–World War II planning to 1950 rather than photocopies of war plans). Whereas the first five volumes shed light on US war planning from 1919 to 1941 at the strategic level, this most recent ad≠ dition—which is also a "documentary sourcebook" (p. 371)—primarily focuses on the wartime plans to accomplish national objectives through "theater army group and army level operations" (p. 3). Un≠ like the earlier books, however, the plans repro≠ duced here are not photocopies but transcrip≠ tions—and therefore are much easier to read.

Part 1—essentially a foundation for parts 2 and 3, both of which form the heart of the book—is a review of key prewar plans and documents at the strategic level. It contains 1938's "Study of Joint Ac≠ tion in the Event of Violation of Monroe Doctrine by Fascist Powers"; Rainbow no. 1 (14 October 1939); Rainbow no. 4 (14 August 1940); and Rain-bow no. 5 (revised 19 November 1941), the war plan that served as a basis for American action dur≠ ing the war. Part 1 also includes the results of dis≠ cussions and planning sessions between the United States and Great Britain—the United States–British Staff Conversation Report, ABC-1 (27 March 1941)—as well as the document that set equipment and mobilization requirements for the American war effort: the Victory Program of 11 September 1941. Following part 1's emphasis on strategic planning, the remaining two parts deal with the actual theater-level war plans to carry out national objectives. Part 2 covers the war in North Africa and Europe, and part 3 deals with the war against Japan. These plans include such docu≠ ments as Operation Neptune (20 May 1944) for the assault against German-held Europe and Op≠ eration Musketeer II (28 September 1944) for the invasion of Luzon.

Ross does historians a valuable service by put≠ ting these operational plans in one slim volume. However, given the nature of documentary source-books, these plans lack the complex context in which they developed and evolved. Although Ross includes a short introduction (one to six para-graphs) for each plan, it is not sufficient to convey the background of the final plans, including such factors as logistics, coalition dynamics, personali≠ ties, and so forth. Although the book is clearly de-signed to appeal to students of World War II who are already familiar with this context, those who require more than the book's short introduction to each plan would profit from consulting Ross's own excellent analysis of American planning and execution during World War II: *American War Plans, 1941–1945: The Test of Battle* (Frank Cass, 1997). This book fills in many of the contextual

factors that surrounded American war planning prior to and during World War II.

A second issue the reader must keep in mind—one that has become an increasingly common and unwelcome refrain in many reviews—is the price of the book. At a hefty $89.95, the volume is clearly targeted at libraries, not the individual reader—an unfortunate circumstance since the book is an important reference that would benefit all World War II historians.

Although it lacks the broad context of the plans and is encumbered by a substantial price tag, this book is extremely valuable, not only for World War II historians but also for people who wish to understand the evolution of joint and coalition warfare in the twentieth century. As the United States wages its campaign against terrorists throughout the world, it is enlightening and instructive to read the plans for a global war of an earlier day. Steven T. Ross's *U.S. War Plans: 1938–1945* allows us to do so.

Dr. Kevin C. Holzimmer
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The Russian People and Foreign Policy: Russian Elite and Mass Perspectives, 1993–2000 by William Zimmerman. Princeton University Press (http://www.pupress.princeton.edu), 41 William Street, Princeton, New Jersey 08540-5237, 2002, 250 pages, $65.00 (hardcover), $19.95 (softcover).

Melding quantitative methodologies with precise writing, eminent political scientist William Zimmerman sheds light on one area of post-Soviet governance: the link between, and disparities among, social elites and the masses in formulating foreign policy in contemporary Russia. Using data collected during the tumultuous decade following the collapse of the Soviet Union, Zimmerman explores how various major groupings in Russian society develop their respective opinions toward a variety of foreign-policy positions. Tracking and interpreting data at different points in "democratic" Russia, *The Russian People and Foreign Policy* explores how an individual's politics relates to his or her market orientation; how the elites influence the masses' development of foreign policy; how one's view of the international system links with electoral behavior; and how Russians reacted to the North Atlantic Treaty Organization's (NATO) expansion into Eastern Europe. This book stands out among modern works on Russian society, making significant academic contributions in the areas of democratic consolidation, development of a solid theoretical foundation, and enlightened implications for Western practitioners of foreign policy.

Employing a variety of graphs understandable to readers who have a basic foundation in statistics, Zimmerman offers unique interpretations that are consistently engaging. Readers not interested in the empirical minutiae can read the chapters' conclusions and implications, which shed bright light on the previous extrapolations. Of course, this book is of great interest to Air Force members who interact with the Russian government and people; however, Zimmerman's devotion of an entire chapter on the Russian elite and mass reactions to NATO expansion appeals to a broader military audience. After orienting themselves to the main players, as laid out in the first chapter, military members could skip to chapter 6. The lack of general Russian awareness of NATO's expansion plans as late as 1997, shortly before the three Visegrad states were offered membership, actually proved quite disturbing. After 1999 and NATO's advance eastward, Russian awareness of NATO's growth increased, with a concomitant rise in Russian perception that NATO posed a real threat to Russia's security. Zimmerman's conclusions that NATO's actions in Eastern Europe have had both positive and negative effects on Russia are sure to interest both members and aspirants of the alliance. Overall, *The Russian People and Foreign Policy* is worth thoughtful perusal for US policy makers as well as the people who carry out that policy.

Joe Derdzinski
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Mach 3+: NASA/USAF YF-12 Flight Research, 1969–1979, Monographs in Aerospace History no. 25, by Peter W. Merlin. NASA History Division, Office of External Affairs (http://www.hq.nasa.gov/office/pao/History/history.html), NASA Headquarters, Washington, D.C. 20546, 2002, 154 pages. (To obtain a copy of this monograph, send a self-addressed, flat-rate, priority-mail envelope [8" x 11"] to the NASA Dryden Flight Research Center History Office, Mail Stop 1613, P.O. Box 273, Edwards, California 93523.)

Although literature on the Mach 3+ "Blackbird" is plentiful in the popular-aviation press, this recent volume by Peter Merlin and the National Aeronautics and Space Administration (NASA) offers something entirely new. A well-illustrated and

detailed book on NASA's flight-testing of the YF-12, *Mach 3+* will appeal to anyone interested in an overview of the technical aspects of high-speed flight research, as well as to the "buff" who craves more coverage on the design and operation of this fascinating aircraft.

Still able to outperform other jets in speed and altitude, the Blackbird began life in the 1950s under Kelly Johnson's now-famous Lockheed "Skunk Works" design team. The aircraft, designated the A-12, first flew as a reconnaissance platform for the Central Intelligence Agency; its design produced interesting variants along the way to the one best known to us—the SR-71. *Mach 3+* deals most specifically with the three YF-12A examples during their years of work for NASA's Flight Research Center. The YF-12A was the fighter-interceptor version of the A-12 that the public learned about in 1964 and that set official speed and altitude records in 1965 of 2,070 miles per hour and 80,257 feet, respectively. Although it never became operational as an interceptor, the Blackbird established its fame as the veil of secrecy lifted on the SR-71 strategic-reconnaissance version of the aircraft.

Peter Merlin's monograph is the first comprehensive history of a decade of joint testing by the Air Force and NASA, who used the YF-12A to explore materials, structures, loads, heating, aerodynamics, and performance at high altitude and speeds greater than Mach 3. The author cites recently declassified documents and makes good use of personal interviews with key figures in the program's history. Many readers will appreciate Merlin's scholarship as a historical researcher—the book is well footnoted and includes useful appendices and a substantial bibliography. Enthusiasts looking for color photos, diagrams for model construction, and such will need to look elsewhere, but *Mach 3+* definitely covers its technical subject most thoroughly.

Col John Chilstrom, USAF
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Mick Mannock, Fighter Pilot: Myth, Life and Politics by Adrian Smith. Palgrave Macmillan (http://www.palgrave-usa.com/catalogue/catalogue.asp?Title_Id=0-333-77898-7), 175 Fifth Avenue, New York, New York 10010, 2001, 223 pages, $65.00.

Adrian Smith's new account of World War I ace Edward "Mick" Mannock—Britain's most successful fighter pilot and recipient of the Victoria Cross—is full of intrigue. Well researched and documented, it nevertheless leaves the reader with many unanswered questions about a mysterious personality who met his end under unclear circumstances—not atypical of many military figures throughout history. We are not certain about where Mannock is buried, how many aircraft he shot down, how and why he died, what his politics were, and whether or not this "ace with one eye" truly had only half vision. His remains may or may not be in the tomb of the "Unknown British Aviator" at Laventie, France. Officially, he shot down 50 enemy aircraft; the unofficial total is 73. On the last day of his life, why did he put himself in such danger from ground fire while flying at low altitude in a state of depression? Could he see out of his left eye or not, and did his socialist political leanings and strong support of the Labour Party and "home rule" cloud any of his record or historical recognition? The story of Mannock is one of myth, controversy, legend, and circumstantial evidence that Smith has collected into a fascinating study of personality, politics, aerial combat, and wartime life.

Mannock's fame and legacy arise from his reputation as an innovative tactician motivated by resolute hatred of the enemy. He didn't enjoy killing Germans but simply abhorred the thought of running away from them, determined to help destroy what they stood for. With an intense appetite for kills and glory, he earnestly sought the fight, painfully languishing when he found himself grounded or in backwater positions away from France. Smith records Mannock's 18 months in combat from April 1917 to 26 July 1918, the day he was killed. During this short but very active period of service, Mannock flew with 40 Squadron, 74 Squadron, and 85 Squadron, moving from second lieutenant to acting major and squadron commander. Leadership positions challenged him to balance his lust for aerial victories against his obligation to carry out the assigned mission. Often he incurred the wrath of fellow fliers who believed he sacrificed the latter to satisfy the former. He was the quintessential solo killer who attracted much attention, which served to boost morale. But such celebrity status also earned the disdain of fliers who resented what they perceived as his lack of chivalry.

Smith's book effectively reminds the reader that, unlike contemporary aerial combat, the first air war was anything but removed from the face-to-face horrors of death in war. This aspect of being

an ace haunted Mannock increasingly as his number of kills rose. He not only dreaded seeing the enemy face a gruesome end, but also feared that the same fate awaited him. The combat life of this famous pilot was not the fanciful image of an undaunted superhero but one of considerable physical and mental exhaustion as well as trauma.

Mannock's contribution to the Allied war effort is difficult to quantify, but Smith accurately points out that it entailed much more than simply destroying enemy planes. Not one to hold his tongue, he expressed valuable opinions about technologies, tactics, and organization that decision makers as high ranking as Lord Hugh Trenchard heard and acted upon. But perhaps Smith's greatest contribution to air force historiography lies in trying to separate myth from reality in the first air war, at least with regard to one of its key participants. Although he leaves the reader with many unanswered questions, that approach is more valuable to the student of history than one that presents a definitive answer which proves unsound.

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Misguided Weapons: Technological Failure and Surprise on the Battlefield by Azriel Lorber. Brassey's, Inc. (http://www.brasseysinc.com/index.htm), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2002, 304 pages, $26.95 (hardcover), $18.95 (softcover).

Pity the poor air warrior. Where can he or she turn? Eliot A. Cohen's new book *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (Free Press, 2002) is built on the theme that war is too important to be left in the hands of generals. Rather, it should be in the hands of the political leaders who should freely question in detail what is going on, down to the lowest levels necessary, and should insist on the primacy of political factors. On the other hand, in *Misguided Weapons* Azriel Lorber also tells us that, yes, war is too important to be left in the hands of generals but that political leaders should not micromanage or meddle in military affairs for the sake of mere political ideology. He also informs us that it is so important that scientists and technologists should have a much larger hand in military decision making. So what is our poor air warrior to believe in the face of such conflicting notions?

Misguided Weapons is about military failure. Although it may be inevitable in such writing, it does seem that the researcher entered the work with the question, How could they have been so stupid? In fact, Lorber uses the word *stupid* so often that it may appear arrogant to some readers—especially those who have commanded in combat, or even in peacetime, when they were awash in a sea of alligators. However, it does seem quite clear that Lorber understands science and technology and equally clear that he has read widely in the published secondary literature of military history. In general, he concludes that failure to properly use technology in war arises from (1) conservative and inflexible thinking, (2) insufficient understanding of the relationship between technology and the battlefield, (3) inadequate leadership and management, (4) arrogant and uninformed heavyweights, and (5) micromanagement often motivated by ideology. Lorber offers all this from the hindsight of history, and one could make a case that he himself is too ready to accept the conventional interpretations of war and battle—that he is not flexible enough to reconsider cases in their context. His treatment of the long-range escort fighter of World War II is one case in point: competent but conventional.

Lorber's complaint is that American air authorities somehow should have appreciated the necessity of escorts much earlier and should have anticipated the possibility of combining technologies and circumstances to protect the long-range strategic bombers over Germany. He understands the problem *as it existed at that moment* and the solution that worked *at that time and place*. But he does not appear to understand that it would have required a superhuman act of foresight to predict the partly fortuitous convergence of a multitude of technical and political factors to make a long-range escort feasible *in that exact circumstance* (but hardly anywhere else).

Notwithstanding the fact that the developmental cycle was much shorter then than it is now, that prediction necessarily would have to have been made *before* the United States got into the war in order to have the escorts ready much before the time they actually appeared. It is better to see the experience as a marvelous case of flexibility for the United States to bring them on-line as soon as it did.

Some of the points left out of the conventional explanation include the fact that experience showed that the long-range escort was a failure (e.g., the Messerschmitt Bf-110). Too, one would have to have understood that there would be no Battle of Britain II and that the British Isles would still be

available when the campaign started. That would have required the prediction that Operation Barbarossa was going to occur in 1941 and suck the Luftwaffe and the rest of the Wehrmacht eastward to chew them up. When we faced the same problem with the B-29 in the Pacific only a year later, 6,000 marines died capturing a P-51 base on the island of Iwo Jima.

If the solution was so obvious, why did every air force in the world (except perhaps that of the Japanese) deem impractical the building of an escort with *both* the agility *and* the range to defeat short-range interceptors? To be sure, the Japanese Zero had the agility, and its drop tanks gave it the range, but its fragility and insufficient firepower wouldn't allow it to survive for long. Claire Chennault himself, no fan of big bombers, asserted that the long-range escort fighter was an impractical proposition.

Would the decision to pursue the long-range escort also require the assumption that Hitler would put a hold on German research and development, forbidding any work that could not make new weapons available almost immediately? Lorber himself criticizes the Germans for not pushing the Me-262 jet as fast as they might have; is it logical, then, to expect prewar airpower thinkers also to predict that the enemy would cooperate in slowing down interceptor development? Would it also have required a forecast that Hitler would divert so many resources to V-1 and V-2 development in the midst of the war? Would it have been reasonable for planners to have in place in England a nontechnical Army Air Forces major who flew the original P-51 and who would wonder whether substituting a British Merlin engine for the American Allison would improve its fuel consumption and performance—all that combined with the laminar flow wing conceived elsewhere?

Perhaps the most preposterous prediction of all would have been anticipating the development of radar in the early 1930s, during development of the B-17. Haywood Hansell himself writes in *The Air Plan That Defeated Hitler* that it was a good thing the planners knew nothing about radar, for that would have prevented them from even thinking about a strategic-bombing attack—which would have been a giant misfortune. Adherence to the conventional view also does not consider subsequent events. In the years immediately after World War II, the new Strategic Air Command was organized with fighter-escort squadrons (equipped with F-84s) organic to the command. When the Korean War started, we quickly discovered that the F-84 was inadequate to face the MiG-15. Besides, by then the bombers so far outranged the jets that desperate expedients such as towing the jets or carrying them in B-36 bomb bays proved fruitless. Soon, the command eliminated escort fighters from its inventory.

If one enters a study of the past with a conceit suggesting that our generation is smarter than those in the past, one is certain to find some evidence to "prove" the old-timers' stupidity. In any event, the prewar planners necessarily had to think in terms of probabilities because they were dealing with the future—an abstraction. But the strategy makers of 1941–43 were not dealing with an abstraction but a known problem—the trip from East Anglia to Berlin and back. Thus, to a large extent they dealt with things as they were, not with things that might be. It is better to think of technical or military surprise as normal and try to make one's guesses less bad than those of the enemy; if the improbable actually happens, it is only a part of the human condition to be surprised.

For the readers of *Air and Space Power Journal,* my recommendation is that, although *Misguided Weapons* is interesting and well written, they should turn to a better book that deals with many of the same issues—Stephen Peter Rosen's *Winning the Next War: Innovation and the Modern Military* (Cornell University Press, 1991).

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Kittyhawks over the Sands: The Canadians and RCAF Americans, Campaigns: MTO [Mediterranean Theater of Operations] no. 1, by Michel Lavigne and James F. Edwards. Lavigne Aviation Publications, P.O. Box 222, Victoriaville, Qc, Canada, G6P 6S8, 2002, 384 pages, $45.00.

Since 1969 the outstanding book *Fighters over the Desert* by the English writer Christopher Shores and his German coauthor Hans Ring has served as the standard by which one measures other aviation history books about the air war in North Africa from 1940 through 1943. Within the last year, however, two indispensable works for the historian or fan of this area of World War II history have appeared: Russell Brown's *Desert Warriors: Australian P-40 Pilots at War in the Middle East and North Africa, 1941–1943* (see my review in *Aerospace Power Journal,* winter 2001) and *Kittyhawks over the Sands,* both of which have set a new standard in this area of study.

Canadian author Michel Lavigne has again teamed with the exceptional Canadian ace James "Stocky" Edwards, a retired wing commander, to produce their second book. (In 1983 they joined forces to write *Kittyhawk Pilot,* Edwards's biography.) Lavigne's latest work, the fourth book he has coauthored, gives historians a superb account of this fascinating subject. Readers should note, however, that *Kittyhawks over the Sands* is by no means an easy read and not the type of book that lends itself to casual reading; rather, the sheer volume of material makes it a reference work.

Unlike *Fighters over the Desert,* which steps through the North African campaign in a day-by-day format, *Kittyhawks over the Sands* focuses on Canadian pilots who flew for the Royal Air Force (RAF), Canadian and American pilots who flew for the Royal Canadian Air Force (RCAF), and squadrons that flew the American-built P-40. Thus, the book deals with the 94, 260, 112, and 250 Squadrons of the RAF and 450 Squadron of the Royal Australian Air Force (RAAF)—specifically, their battles with the Italians and the German Luftwaffe in North Africa. Lavigne and Edwards present a staggering amount of information about each squadron, including unit histories, casualties, and claims. For example, the data on casualties includes the date, type of aircraft flown, pilot's name and fate, source of shootdown, and location of the battle. For claims, they include date, time, name and nationality of the victorious pilot, type of aircraft shot down, and battle location. Throughout the book, readers will find pilot profiles, anecdotes, and 350 black-and-white photographs as well as 16 color pages of aircraft and pilots. In addition to historical information about the squadrons, the book offers appendices covering the combat records of P-40 units, P-40 aces, Canadian and American RCAF casualties, and claims made by Canadian and American RCAF pilots.

Perhaps what I like the most about *Kittyhawks over the Sands* are the pilot accounts and stories of aerial combat, ground attack, and pilot losses from both sides. Lavigne and Edwards intriguingly piece together air combats, including photographs of men who shot each other down and of aircraft destroyed later in the campaign. I also admire their brutally honest treatment concerning instances of overclaiming by the RAF, RCAF, RAAF, and Luftwaffe. For example, on the one hand, although RAF 112 Squadron claimed 211 aircraft destroyed between June 1940 and May 1943, the authors' research corroborates only 100 to 110. On the other hand, the claim of 65.5 victories by 260 Squadron (Edwards's unit) from June 1941 to May 1943 is almost completely verifiable, demonstrating the book's historical objectivity and desire to present the most accurate and unbiased information possible.

The collaborative effort adds a special, unique element to this work. Edwards's abilities as a combat pilot are well documented (22 kills, six probables, 15 damaged, 12 destroyed on the ground, and 200 military vehicles destroyed), and since he helped so much with the book, it includes many of his combat reports. One of the most interesting describes the downing of German ace Otto Schulz, who had 51 kills at the time of his death.

Having met and talked with several Luftwaffe pilots who fought in this theater, I was interested to see information about them here, including a photograph of an aircraft flown by the German ace Lt Friedrich Koerner (36 victories) that I had never seen before. Likewise, the book's other details about Koerner nicely augmented my own research and interviews with him.

Kittyhawks over the Sands deserves the highest praise—words such as *phenomenal, indispensable,* and *essential* readily come to mind. Lavigne and Edwards have teamed up once again to write a book titled *Hurricanes over the Sands,* which I am eager to read. *Kittyhawks over the Sands* should establish Michel Lavigne as a fully appreciated expert and capable military historian. Readers interested in this area of World War II aviation history simply must include this book—at $45.00, an astonishing value—in their libraries.

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Faster, Further, Higher: Leading-Edge Aviation Technology since 1945 edited by Philip Jarrett. Putnam Aeronautical Books (http://www.chrysalisbooks.co.uk/books/publisher/putnam), 64 Brewery Road, London, United Kingdom N7 9NT, 2002, 256 pages, $53.85 (hardcover).

Faster, Further, Higher is a very ambitious collection of 13 essays that cover aviation technology over the past 50 years. Most of the authors, with the exception of Richard Hallion and Jerry Scutts, are probably unknown to the readers of this journal. However, they bring impressive credentials and skills to the task at hand and clearly demonstrate their abilities in this valuable effort.

One finds much to be said in favor of this book. It spans a broad range of topics from a wider per-

spective than most American military readers are accustomed to. For example, both commercial and British aviation receive at least equal play with military and American aviation. The topics are up to date and deal with a number of projects (F-22 Raptor, F-35 Joint Strike Fighter, V-22 Osprey, and unmanned aerial vehicles) and issues (avionics, engines, and simulations) in today's spotlight. Test aircraft are well covered, along with other, usually neglected, topics such as manufacturing and aircraft instruments. The authors' inclusion of some very technical material certainly indicates that they have no intention of talking down to the reader. The book also includes excellent illustrations. Perhaps most important, all the essays, although they lack citations, have very useful bibliographies. I won't bore the reader with my favorite chapters, but I will say that a number proved valuable to me, as they will to others interested in the book's subject. Finally, this volume not only is up to date, but also devotes considerable attention to elements in development or on the drawing board—a feature that should give this collection longevity well beyond its publication date.

Negative elements are not as significant. As with all collections, especially one with such broad scope, the quality of essays is mixed. Some of them wander and just don't come to grips with the subject at hand. In addition, readers will always judge the choice of topics in relationship to their own interests. I believe that at least three topics received less attention than they deserved: turboprops, command and control, and stealth. But the principal problem of Jarrett's collection is readability. The depth of detail, technical jargon, and British slang make many essays difficult to read—something one might expect from a technical text for engineers rather than a survey for interested laymen or students of the field.

In summary, *Faster, Further, Higher* is a good book that should be in every library that supports aviation themes. Students of aviation technology will profit greatly from the bibliographies and some, if not many, of the articles. Others will surely benefit from this volume, but their efforts will require steady determination to penetrate the thick prose. In any case, this effort is a fine addition to the publisher's History of Aircraft series and to the literature on aviation technology.

Kenneth P. Werrell
Christiansburg, Virginia

Touch and Go

In this section of "Net Assessment," you will find additional reviews of aviation-related books and CD-ROMs but in a considerably briefer format than our usual offerings. We certainly don't mean to imply that these items are less worthy of your attention. On the contrary, our intention is to give you as many reviews of notable books and electronic publications as possible in a limited amount of space. Unless otherwise indicated, the reviews have been written by an ASPJ *staff member.*

The Iran-Iraq War, 1980–1988 by Efraim Karsh. Osprey Publishing Ltd. (http://www.ospreypublishing.com/titles/1841763713), Elms Court, Chapel Way, Botley, Oxford OX2 9LP, United Kingdom, 2002, 96 pages, $14.95 (softcover).

Efraim Karsh analyzes the bloody eight-year conflict between the Islamic Republic of Iran and Ba'thist Iraq in fewer than 100 very readable pages filled with excellent campaign maps and photos. The revolution of 1979 that swept the Shah of Iran from power sparked tensions between Iran and Iraq that ultimately led to war. Ayatollah Khomeini appealed to "true" Muslims to overthrow corrupt regional governments, and Saddam Hussein's Iraq became the self-styled Imam's first target. Saddam discovered that starting a war to secure access to the Gulf proved more difficult than ending it. Iraqi aggression gave the Iranian regime the means to sustain revolutionary and patriotic fervor—Iran refused Iraqi appeals for peace for eight years, despite terrible human and economic costs. Fearing Tehran's radical Islamist doctrine, Middle Eastern states and major Western powers supported Iraq.

Consequently, Iran grew progressively weaker while Iraq enjoyed dramatic, but illusory, military growth and foreign investment. The war ended in August 1988, when both nations accepted UN Resolution 598. Iran remained isolated and bitter; Iraqi leaders realized that the war's mortgage would weaken their country for decades. Three years later, Saddam again tried (and failed) to solve his country's economic and security challenges by using military force. *The Iran-Iraq War, 1980–1988,* part of the Osprey Essential Histories series, is an excellent source for undergraduate courses in history or political science; it would also serve as a good introductory reader for recent Middle Eastern strategic studies.

Stormchasers: The Hurricane Hunters and Their Fateful Flight into Hurricane Janet by David Toomey. W. W. Norton & Company, Inc. (http://www.wwnorton.com), 500 Fifth Avenue, New York, New York 10110, 2002, 224 pages, $25.95 (hardcover).

Because of the number of variables at play and the effects of so many other unknowns, the study of weather is an imperfect science. Determining storm tracks and predicting the occurrence of severe weather or even rain at a specific place and time five days out can be an immense challenge. One can imagine the task facing hurricane forecasters in the early and mid-1950s, working without the benefit of advanced computers and satellite imagery; nevertheless, the American public depended upon them for timely and accurate warnings of impending, destructive weather. They might as well have tried scaling Mount Everest using just toothpicks for climbing gear.

The men of the US Air Force and Navy—the Hurricane Hunters—served as the eyes and ears of the National Hurricane Center. Toomey tells the story of one particular Navy Hurricane Hunter crew that flew into Hurricane Janet in 1955—and did not return. He combines this tale with a history of meteorology as it relates to the development of the art and science of forecasting, as well as a history (up until 1955) of "storm chasing," which evolved from a wager during World War II.

One finds similarities between *Stormchasers* and Sebastian Junger's *The Perfect Storm: A True Story of Men against the Sea*. Both recount the drama of facing extreme weather events. Both fold in the art and science of weather, speculations about what might have happened in the final minutes of the main characters' lives, and facts about what happened to the people left behind. And both describe fearsome storms!

Toomey goes to great lengths to explain the development of weather prediction from its infancy with early "meteorologists," whose ideas included basic models of hurricanes, the foundation for numeric weather prediction, and even the impetus to employ early computers in such prediction—which went far beyond "weather guessing." The reader gains valuable insight into just how inexact a science weather forecasting was, only 45 years ago. The discussion about methods of "working a hurricane" also helps one better understand how USAF Hurricane Hunter crews do their job.

Toomey's subjects will satisfy the curiosity of a variety of readers: those looking for a story about perilous events, an introductory history of tropical meteorology, or a primer on concepts of forecasting that were 100 years ahead of their time. *Stormchasers* delivers on all counts.

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The Precision Revolution: GPS and the Future of Aerial Warfare by Michael Russell Rip and James M. Hasik. Naval Institute Press (http://www.usni.org/usni.html), 2062 Generals Highway, Annapolis, Maryland 21401-6780, 2002, 448 pages, $48.95.

From the outset, the authors emphasize the technological importance of the Global Positioning System (GPS), which enabled cruise missiles to hit their targets with accuracy and gave US armored forces the ability to navigate the featureless terrain during Operation Desert Storm. They also largely succeed in making this sort of complex technology more understandable, explaining the system's processes for measuring time and distances and determining a position in three dimensions. Chapters also delve into specific systems that make use of GPS, such as the joint direct attack munition (JDAM), which delivers 2,000 pounds of explosives with great accuracy. Such increased accuracy and miniaturization of munitions technology make the dumping of thousands of tons of dumb bombs, as occurred during the Vietnam War, both unnecessary and obsolete. Rip and Hasik also consider the advantages and limitations of precision missiles and military technology in the Yugoslavia campaign as well as the war on terrorism, arguing that such weaponry is not a panacea for transnational ter-

rorists that operate in the hills of Afghanistan and that we must gather accurate intelligence on the ground before we deploy such systems. They also offer a look into little-known innovations, such as precision artillery shells for howitzers developed for the US Army. In sum, *The Precision Revolution* is an excellent book for readers involved with munitions, navigation, and advanced air and space systems.

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The Hostile Sky: A Hellcat Flyer in the Pacific by James W. Vernon. Naval Institute Press (http://www.usni.org/press/booksearch.htm), 291 Wood Road, Annapolis, Maryland 21402, 2002, 176 pages, $28.95 (hardcover).

A half century has gone by, and one must wonder whether America is as resilient as it was in the days of James W. Vernon, a teenaged naval aviator in the midst of the chaos of World War II. Born in Minnesota, living his life in the West, and emerging from a family breaking up at the onset of World War II, he nonetheless was able to survive and even prosper in the face of changes that would shake the equanimity of many modern Americans.

Vernon, who had a couple of years of college under his belt when he started with the Navy at a school of mines, uses a fine writing style that he acquired somewhere along the pike to recount his experiences—for example, the dazzling rapidity of change. Frequently shifted from training locations in California, to Texas, to Florida, and back to California, he managed to survive. He also made his way through radically different training in Dauntless dive-bombers, checking out in the SB2C Curtiss Helldiver and then in the Hellcat itself. To be sure, the world was simpler then. Changing from one type of aircraft to another seemed not to require any transition at all—pilots moved from dive-bomber to fighter merely by sitting in the cockpit for a spell and then taking off to learn by doing. And they did so in one of the most dangerous of flying environments—the deck of an aircraft carrier. Vernon then went on with blazing speed to fly the F-6F in fighter-bomber operations during the closing phases of the war in the Pacific, when the kamikazes were at their zenith. Little wonder that so many young men did not survive—but Vernon did to go on to an impressive postwar career as a geologist.

I suppose that one might classify *The Hostile Sky* as another war memoir—an adventure story, pure and simple. Vernon, however, covers much more than the operational dimension. Grieving for lost shipmates was an everyday routine then, and he is candid about that experience, as well as about off-duty cavorting in a world that offered little assurance of a future. Vernon's book is an engaging read for an evening, and I recommend it on that basis.

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North American XB-70A Valkyrie, vol. 34, Warbird Tech series, by Dennis R. Jenkins and Tony Landis. Specialty Press (http://www.specialty press.com), 39966 Grand Avenue, North Branch, Minnesota 55056, 2002, 104 pages, $16.95 (softcover).

North American XB-70A Valkyrie, one of the latest entries in Specialty Press's Warbird Tech series, thoroughly covers an aircraft that will forever remain impressive. More than three decades after its final flight, visitors to the US Air Force Museum are still awed by the sleek craft's magnificent lines and its ability to fly at three times the speed of sound. Jenkins and Landis cover their subject from initial concepts, through program development, to several years of flight-testing. Additionally, this very well illustrated book devotes ample space to technical aspects of the XB-70's design.

The first portion pays considerable attention to the aircraft's conception and difficult development history throughout the 1950s. Jenkins and Landis cite the political, economic, and strategic reasons for the bomber program's demise and its ultimate incarnation as a high-speed experimental aircraft, emphasizing the then-prevalent view that intercontinental ballistic missiles would replace manned bombers. However, they scarcely mention the changes in tactical employment—from high to low altitude, demanded by the advancement of surface-to-air missiles—that doomed the B-70 as a bomber.

Flying for the first time in September 1964, the XB-70 lasted fewer than five years and logged just over 250 total hours—mostly in testing and later researching the practicality of supersonic flight by large aircraft, including duty as a National Aeronautics and Space Administration test subject for an American supersonic transport. Surprisingly few pages (and no new photographs) in the book are devoted to the dramatic and tragic midair collision of 1966 that claimed the second of the two aircraft built. Furthermore, although this volume

offers a wealth of photographs, drawings, and data, it scrimps on personal accounts.

North American XB-70A Valkyrie should prove popular with readers interested in X-planes, high-speed flight, or simply the evolution and experimentation that occurred during America's quest for the ultimate Cold War bomber. Oddly, publications about the XB-70 remain scarce despite the public's fascination with the aircraft. Jenkins and Landis fill a void in the literature with this comprehensive look at the Mach 3+ XB-70A Valkyrie.

Col John S. Chilstrom, USAF
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The First World War: The Western Front, 1914–1916 by Peter Simkins. Osprey Publishing (http://www.ospreypublishing.com), Elms Court, Chapel Way, Botley, Oxford OX2 9LP, 2002, 95 pages, $14.95.

This book, number 14 in Osprey Publishing's Essential Histories series, is the first of two volumes on the western front in World War I. The author, Peter Simkins, is a historian and professor with nearly 40 years' experience at England's Imperial War Museum and the University of Birmingham. The editor, Prof. Robert O'Neill, is an equally qualified historian, author, and educator.

This short volume will prove useful to anyone unfamiliar with World War I. It leads off with a chronology that provides an easy reference for major events of the period, from the assassination of Archduke Franz Ferdinand of Austria on 28 June 1914 to Gen Robert Nivelle's replacement of Gen Joseph Joffre as French commander in chief on 12 December 1916. Simkins then discusses the background, the warring sides, the outbreak of the conflict, and the fighting itself. Other sections paint pictures of the war's three critical elements—soldiers, civilians, and the home front. The stories of Pvt Archie Surfleet and Winnifred Adair Roberts serve as composites of the typical experiences of soldiers and civilians.

Although this volume does not reach the level of serious historical scholarship, it suffices as an introduction to issues pertinent to the Great War. From this brief overview of the people, politics, and events of the first two years of the war, readers desiring more information and deeper understanding can move on to more in-depth histories. In addition to the engaging narrative, the book offers numerous photographs—including images of every major leader in the war as well as action photos that graphically depict the brutality of trench warfare—and maps that illustrate the significant battles and troop movements.

Unfortunately, Simkins does not adequately address the war in the air, making only a few scant references to aerial reconnaissance. That deficiency aside, *The First World War: The Western Front, 1914–1916* is a valuable primer on "the war to end all wars."

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F-117 Nighthawk, Combat Legends, by Paul F. Crickmore. Crowood Press (http://www.crowoodpress.co.uk/780/index.asp), The Stable Block, Crowood Lane, Ramsbury, Marlborough, Wiltshire SN8, 2HR, England, 2003, 96 pages, $14.95 (softcover).

One of the newest entries in Airlife Publishing's (recently acquired by Crowood Press) Combat Legends series, *F-117 Nighthawk* devotes a significant number of pages—almost half—to the airplane's development and early operational periods. This portion and the one on the stealth fighter's performance during Operation Desert Storm make up 75 percent of the total text—information that is readily available in other publications. Admittedly, the fact that much of the F-117's recent history has not yet been released accounts for the book's emphasis on past performance. Crickmore does briefly discuss the post–Desert Storm period, including the three aircraft lost in the 1990s—although the appendix containing the tail-number histories includes updated data on only one of those F-117s.

In addition to the lack of new information, the book can be tiring to read at times. Some passages are very well written, but much of the text seems choppy, with long, clumsy phrasing and curious punctuation. The author's use of "1-17," for example, as an abbreviation for the plane's designation (possibly a Briticism) seems rather quirky. I found these practices both annoying and distracting.

Although some aspects of *F-117 Nighthawk* are appealing, particularly its selection of photographs, I can't recommend it over other books on the stealth aircraft—at least not in its present form. It would benefit from more meticulous editing.

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AIR AND SPACE POWER JOURNAL Volume XVII

AUTHOR INDEX

AWC Seminar Six, Dr. Stephen O. Fought, and Col O. Scott Key. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.

Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.

Cain, Lt Col Anthony C. [no title] (prelaunch notes), no. 1 (spring 2003): 17.

———. "Air and Space Power: Asymmetric Advantage for the United States" (flight lines), no. 1 (spring 2003): 18–19.

Cain, Col Anthony C. [no title] (prelaunch notes), no. 2 (summer 2003): 5.

———. [no title] (prelaunch notes), no. 3 (fall 2003): 11.

———. [no title] (prelaunch notes), no. 4 (winter 2003): 13.

———. "A Century of Air and Space Power" (flight lines), no. 4 (winter 2003): 14–15.

———. "Regional Security and Air and Space Power" (flight lines), no. 3 (fall 2003): 12–13.

———. "The Transformation of Air and Space Power in Operation Iraqi Freedom" (flight lines), no. 2 (summer 2003): 6–7.

Cain, Col Anthony C., and Lt Col Larry Weaver. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Cares, Cmdr Jeffrey R., Col Robert W. Freniere, and Cmdr John Q. Dickmann. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.

Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.

Crowder, Col Gary L., Maj Gen David A. Deptula, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.

Davis, Col (Dr.) Jim A. "The Looming Biological Warfare Storm: Misconceptions and Probable Scenarios," no. 1 (spring 2003): 57–67.

Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.

Dickmann, Cmdr John Q., Cmdr Jeffrey R. Cares, and Col Robert W. Freniere. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.

Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.

Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.

Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.

Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.

Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.

Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.

Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.

Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.

Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.

Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.

Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.

Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.

Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.

Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.

Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.

Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.

Key, Col O. Scott, Dr. Stephen O. Fought, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.

Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.

Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.

Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.

Leftwich, James A., Col (Dr.) Robert Tripp, Maj Gen Terry L. Gabreski, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.

Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.

Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.

McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.

Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.

Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.

Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.

Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.

———. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.

Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.

Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU/NATO Defense Force Integration," no. 3 (fall 2003): 93–98.

Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.

Roll, Dr. C. Robert, Jr., Maj Gen Terry L. Gabreski, James A. Leftwich, Col (Dr.) Robert Tripp Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.

Schneider, Dr. Dean L., and Lt Col Richard R. Baskin. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.

Stamper, Maj George L., Jr., Maj Gen David A. Deptula, and Col Gary L. Crowder. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.

Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.

Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

Tripp, Col (Dr.) Robert, Dr. C. Robert Roll Jr., Maj Gen Terry L. Gabreski, James A. Leftwich, and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.

Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

von Hoffman, Maj Cauley, Maj Gen Terry L. Gabreski, James A. Leftwich, Col (Dr.) Robert Tripp, and Dr. C. Robert Roll Jr. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.

Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

TITLE INDEX

[no title] (prelaunch notes), Lt Col Anthony C. Cain, no. 1 (spring 2003): 17.

[no title] (prelaunch notes), Col Anthony C. Cain, no. 2 (summer 2003): 5.

[no title] (prelaunch notes), Col Anthony C. Cain, no. 3 (fall 2003): 11.

[no title] (prelaunch notes), Col Anthony C. Cain, no. 4 (winter 2003): 13.

"Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," Col Russell J. Handy, no. 3 (fall 2003): 57–64.

"Air Expeditionary Access: The African Connection," Col Brian K. Hall, no. 3 (fall 2003): 47–56.

"Airpower, Jointness, and Transformation," Dr. Stephen O. Fought, Col O. Scott Key, and AWC Seminar Six, no. 4 (winter 2003): 40–53.

"Air and Space Nation Is in Peril, The" (vortices), Phillip S. Meilinger, no. 1 (spring 2003): 20–31.

"Air and Space Power: Asymmetric Advantage for the United States" (flight lines), Lt Col Anthony C. Cain, no. 1 (spring 2003): 18–19.

"America's First Air-Land Battle," Dr. Bert Frandsen, no. 4 (winter 2003): 31–38.
"Attack Operations: First Layer of an Integrated Missile Defense," Lt Col Merrick E. Krause, no. 1 (spring 2003): 101–12.
"Benelux Deployable Air Task Force, The: A Model for EU/NATO Defense Force Integration," Lt Col Dave L. Orr, no. 3 (fall 2003): 93–98.
"Century of Air and Space Power, A," Col Anthony C. Cain (flight lines), no. 4 (winter 2003): 14–15.
"China and India: Friends or Foes?" Lt Col Mona Lisa D. Tucker, no. 3 (fall 2003): 65–71.
"Chinese Air Force and Air and Space Power, The," Lt Col Thomas R. McCabe, no. 3 (fall 2003): 73–83.
"Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," Maj Gen Terry L. Gabreski, James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman, no. 1 (spring 2003): 113–24.
"Complexity-Based Targeting: New Sciences Provide Effects," Col Robert W. Freniere, Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares, no. 1 (spring 2003): 95–100.
"Cost-Benefit Economics: Enhancing National Security and Air and Space Power," Lt Col Michael R. Weeks, no. 3 (fall 2003): 27–37.
"Developing Space Power: Building on the Airpower Legacy," Hon. Peter B. Teets, no. 1 (spring 2003): 11–15.
"Direct Attack—A Counterland Mission" (vortices), Lt Col Phil M. Haun, no. 2 (summer 2003): 9–16.
"Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," Maj Gen David A. Deptula, Col Gary L. Crowder, and Maj George L. Stamper Jr., no. 4 (winter 2003): 5–12.
"Emerging Biocruise Threat, The," Col Rex R. Kiziah, no. 1 (spring 2003): 81–94.
"F-35: The 'F' Stands for 'Future' " (pirep), John Kent, no. 1 (spring 2003): 41–46.
"High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," Lt Col (sel) S. Didi Kuo, no. 1 (spring 2003): 47–56.
"Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," Col Gordon R. Hammock, no. 3 (fall 2003): 84–92.
"Latin American Countries with Space Programs: Colleagues or Competitors?" Lt Col Robert D. Newberry, no. 3 (fall 2003): 39–45.
"Learning as a Weapon System," Lt Col Richard R. Baskin and Dr. Dean L. Schneider, no. 2 (summer 2003): 97–104.
"Looming Biological Warfare Storm, The: Misconceptions and Probable Scenarios," Col (Dr.) Jim A. Davis, no. 1 (spring 2003): 57–67.
"Losing Air Superiority: A Case Study from the Second World War," Dr. Richard R. Muller, no. 4 (winter 2003): 55–66.
"Military OR Ethics," Dr. James H. Toner, no. 2 (summer 2003): 79–86.
"Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), Maj Michael Pietrucha, no. 1 (spring 2003): 32–40.
"Neglected Air Force Combat Missions" (vortices), Maj Collin Ireton, no. 2 (summer 2003): 17–29.
"Normandy: A Modern Air Campaign?" Dr. Thomas Alexander Hughes, no. 4 (winter 2003): 16–29.
"Not-So-Forgotten War, The: Fodder for Your Reading on the Air War in Korea a Half Century Later," Dr. David R. Mets, no. 4 (winter 2003): 77–95.
"Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," Lt Col Harry W. Conley, no. 1 (spring 2003): 69–79.
"Regional Security and Air and Space Power" (flight lines), Col Anthony C. Cain, no. 3 (fall 2003): 12–13.
" 'Reining in' the Center of Gravity Concept," Lt Col Antulio J. Echevarria II, no. 2 (summer 2003): 87–96.
"Shift to a Global Perspective" (a word from the chairman), Gen Richard B. Myers, no. 3 (fall 2003): 5–10.
"Strategic Leadership: Defining the Challenge," Col W. Michael Guillot, no. 4 (winter 2003): 67–75.
"Task Force Concepts of Operations: Transforming the USAF," Lt Col Larry Weaver and Col Anthony C. Cain, no. 2 (summer 2003): 49–56.
"Training: The Foundation for Air and Space Power Transformation," Lt Col John M. Fawcett Jr., no. 2 (summer 2003): 57–67.
"Transformation of Air and Space Power in Operation Iraqi Freedom, The" (flight lines), Col Anthony C. Cain, no. 2 (summer 2003): 6–7.
"Transformation from the War Fighter's Perspective" (pirep), Col Kurt "Two-Lips" Dittmer, no. 2 (summer 2003): 31–34.
"Transforming Homeland Security: Intelligence Indications and Warning," Lt Col Kenneth A. Luikart, no. 2 (summer 2003): 69–77.
"Understanding Transformation" (a word from the chairman), Gen Richard B. Myers, no. 1 (spring 2003): 5–10.
"US National Security Strategy and the Imperative of 'Geopresence,' " Gen Gregory S. Martin, no. 2 (summer 2003): 35–48.
"Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," Col Chris J. Krisinger, no. 3 (fall 2003): 15–25.
"Words and Weapons: The Power of Discourse," Lt Col Edith A. Disler, no. 3 (fall 2003): 99–106.

SUBJECT INDEX

Air Force History
Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.

Air Force Organization
Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.
Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU/NATO Defense Force Integration," no. 3 (fall 2003): 93–98.
Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Airlift
Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.
Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.
Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU/NATO Defense Force Integration," no. 3 (fall 2003): 93–98.

Airpower
Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.
Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.
Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.
Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.
Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.
Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.
McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.
Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.
Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.
Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.
Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.
Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.
Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

Airpower History
Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.
Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.
Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.

Air and Space Expeditionary Force (AEF)
Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.

Air Superiority
Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.
Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.

Arms Control
Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

Asia
McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.

Aviation Technology
Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.
Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.

Ballistic Missile Defense
Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.

Basing
Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.
Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.

Book Reviews
Bashow, David L. *Knights of the Air: Canadian Fighter Pilots in the First World War,* reviewed by Lt Col Martin A. Noel Jr., USAF, retired, no. 3 (fall 2003): 114.

Bergeron, Kenneth D. *Tritium on Ice: The Dangerous New Alliance of Nuclear Weapons and Nuclear Power,* reviewed by Capt Jay Hemphill, no. 4 (winter 2003): 98.

Biddle, Tami Davis. *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945,* reviewed by Dr. William Dean, no. 3 (fall 2003): 114–16.

Black, Jeremy, ed. *European Warfare, 1815–2000,* reviewed by Dr. Stephen A. Bourque, no. 2 (summer 2003): 111–12.

———. *Warfare in the Western World, 1882–1975,* reviewed by Col Eric Ash, no. 2 (summer 2003): 107–8.

Connelly, Owen. *On War and Leadership: The Words of Combat Commanders from Frederick the Great to Norman Schwarzkopf,* reviewed by Lt Col Robert B. Kane, no. 3 (fall 2003): 108–9.

Conners, Bernard F. *Tailspin: The Strange Case of Major Call,* reviewed by Maj David Van Veldhuizen, no. 2 (summer 2003): 119.

Cooke, James J. *Billy Mitchell,* reviewed by Col Phillip S. Meilinger, USAF, retired, no. 3 (fall 2003): 109–10.

Cooper, Alan W. *Bombers over Berlin: The RAF Offensive, November 1943–March 1944,* reviewed by Maj James Gates, no. 4 (winter 2003): 101.

Cox, Sebastian, and Peter Gray, eds. *Air Power History: Turning Points from Kitty Hawk to Kosovo,* reviewed by Dr. David R. Mets, no. 3 (fall 2003): 112–13.

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Hart, Russell A. *Clash of Arms: How the Allies Won in Normandy,* reviewed by Maj James P. Gates, no. 2 (summer 2003): 115–17.

Hendrickson, Ryan C. *The Clinton Wars: The Constitution, Congress, and War Powers,* reviewed by Maj Paul Niesen, no. 3 (fall 2003): 122–23.

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Jenkins, Dennis R., and Tony Landis. *North American XB-70A Valkyrie* (touch and go), reviewed by Col John S. Chilstrom, no. 4 (winter 2003): 113–14.

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Kagan, Frederick W., and Robin Higham, eds. *The Military History of Tsarist Russia,* reviewed by Lt Col Robert B. Kane, no. 2 (summer 2003): 106–7.

Kane, Robert B. *Disobedience and Conspiracy in the German Army, 1918–1945,* reviewed by Dr. Douglas Peifer, no. 4 (winter 2003): 101–3.

Karsh, Efraim. *The Iran-Iraq War, 1980–1988* (touch and go), reviewed by *ASPJ* staff, no. 4 (winter 2003): 111–12.

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Lavigne, Michel, and James F. Edwards. *Kittyhawks over the Sands: The Canadians and RCAF Americans,* reviewed by Lt Col Rob Tate, no. 4 (winter 2003): 109–10.

Lerner, Mitchell B. *The Pueblo Incident: A Spy Ship and the Failure of American Foreign Policy,* reviewed by Capt Gilles Van Nederveen, USAF, retired, no. 2 (summer 2003): 120–21.

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McKay, C. G., and Bengt Beckman. *Swedish Signal Intelligence, 1900–1945,* reviewed by Capt Gilles Van Nederveen, USAF, retired, no. 3 (fall 2003): 120–21.

Meilinger, Phillip S. *Airwar: Essays on Its Theory and Practice*, reviewed by Kenneth P. Werrell, no. 3 (fall 2003): 123–24.

Merlin, Peter W. *Mach 3+: NASA/USAF YF-12 Flight Research, 1969–1979*, reviewed by Col John Chilstrom, no. 4 (winter 2003): 106–7.

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Noggle, Anne. *A Dance with Death: Soviet Airwomen in World War II*, reviewed by Guillaume de Syon, no. 3 (fall 2003): 111–12.

O'Hanlon, Michael E., et al. *Protecting the American Homeland: A Preliminary Analysis*, reviewed by Command Sgt Major James H. Clifford, USA, no. 4 (winter 2003): 103.

Oren, Michael B. *Six Days of War: June 1967 and the Making of the Modern Middle East*, reviewed by Lt Comdr Youssef H. Aboul-Enein, MSC, USN, no. 4 (winter 2003): 103–4.

O'Rourke, G. G., with E. T. Wooldridge. *Night Fighters over Korea*, reviewed by Lt Col Merrick E. Krause, no. 2 (summer 2003): 118–19.

Pace, Steve. *B-25 Mitchell Units of the MTO* (touch and go), reviewed by Col Frank L. Goldstein, PhD, USAF, retired, no. 3 (fall 2003): 125.

Payne, Keith B. *The Fallacies of Cold War Deterrence and a New Direction*, reviewed by Maj John E. Shaw, no. 2 (summer 2003): 117–18.

Pennington, Reina. *Wings, Women, and War: Soviet Airwomen in World War II Combat*, reviewed by Dr. Richard R. Muller, no. 4 (winter 2003): 104–5.

Peters, Ralph. *Beyond Terror: Strategy in a Changing World*, reviewed by Lt Comdr Youssef H. Aboul-Enein, USN, no. 3 (fall 2003): 121.

Rip, Michael Russell, and James M. Hasik. *The Precision Revolution: GPS and the Future of Aerial Warfare* (touch and go), reviewed by Lt Comdr Youssef H. Aboul-Enein, MSC, USN, no. 4 (winter 2003): 112–13.

Ross, Robert E. *The Warriors: Reflections of a Fighter Pilot, Test Pilot, and Veteran of the Air Wars over Vietnam*, reviewed by Capt Jay Hemphill, no. 3 (fall 2003): 113–14.

Ross, Steven T., ed. *U.S. War Plans: 1938–1945*, reviewed by Dr. Kevin C. Holzimmer, no. 4 (winter 2003): 105–6.

Simkins, Peter. *The First World War: The Western Front, 1914–1916* (touch and go), reviewed by Command Sgt Major James H. Clifford, USA, no. 4 (winter 2003): 114.

Smith, Adrian. *Mick Mannock, Fighter Pilot: Myth, Life and Politics*, reviewed by Col Eric Ash, no. 4 (winter 2003): 107–8.

Stafford, Thomas P., with Michael Cassutt. *We Have Capture: Tom Stafford and the Space Race*, reviewed by Lt Col Merrick E. Krause, no. 3 (fall 2003): 118–19.

Sweeting, C. G. *Hitler's Squadron: The Fuehrer's Personal Aircraft and Transport Unit, 1933–1945* (touch and go), reviewed by Lt Col Robert F. Tate, USAFR, no. 2 (summer 2003): 124.

Thompson, Warren. *F-86 Sabres of the 4th Fighter Interceptor Wing* (touch and go), reviewed by Kenneth P. Werrell, no. 2 (summer 2003): 125.

Thompson, Warren E., and David R. McLaren. *MiG Alley: Sabres vs. MiGs over Korea* (touch and go), reviewed by Kenneth P. Werrell, no. 3 (fall 2003): 125.

Tomes, Lt Col Jonathan P. *Servicemember's Legal Guide*, 4th ed. (touch and go), reviewed by Herman Reinhold, no. 2 (summer 2003): 123–24.

Toomey, David. *Stormchasers: The Hurricane Hunters and Their Fateful Flight into Hurricane Janet* (touch and go), reviewed by Maj Paul G. Niesen, no. 4 (winter 2003): 112.

Tribble, Alan C. *A Tribble's Guide to Space: How to Get to Space and What to Do When You Are There* (touch and go), reviewed by Maj Paul G. Niesen, no. 2 (summer 2003): 123.

Tsouras, Peter G., ed. *Third Reich Victorious: Alternate Decisions of World War II*, reviewed by Maj Paul G. Niesen, no. 2 (summer 2003): 119–20.

Vance, Jonathan F. *A Gallant Company: The Men of the Great Escape* (touch and go), reviewed by Capt Kevin D. Smith, no. 2 (summer 2003): 125.

Van Staaveren, Jacob. *Gradual Failure: The Air War over North Vietnam, 1965–1966*, reviewed by Maj Paul Niesen, no. 4 (winter 2003): 99–100.

Vernon, James W. *The Hostile Sky: A Hellcat Flyer in the Pacific* (touch and go), reviewed by Dr. David R. Mets, no. 4 (winter 2003): 113.

Young, Peter. *Storm from the Sea*, reviewed by Maj James Gates, no. 3 (fall 2003): 124–25.

Zhang, Xiaoming. *Red Wings over the Yalu: China, the Soviet Union, and the Air War in Korea* (touch and go), reviewed by Mark J. Conversino, PhD, no. 2 (summer 2003): 122–23.

Zimmerman, William. *The Russian People and Foreign Policy: Russian Elite and Mass Perspectives, 1993–2000*, reviewed by Joe Derdzinski, no. 4 (winter 2003): 106.

China

McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.

Clausewitz

Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.

Close Air Support

Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.

Command and Control

Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing

Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.
Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.
Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.
Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.
Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.
Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.

Doctrine
Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.
Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.
Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.
Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.
Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.
Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.
Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.
Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.
Myers, Gen Richard B. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.
Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Effects-Based Operations
Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.
Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.
Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.
Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.
Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.
Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

Electronic Warfare
Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.

Ethics/Values/Virtues
Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.
Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

European Region
Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.
Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.
Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.
Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU/NATO Defense Force Integration," no. 3 (fall 2003): 93–98.

Fighter Operations
Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.

Geopolitics
Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.
Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.
Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.
Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.
McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.
Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.
Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

Homeland Security
Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.
Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.

Humanitarian Operations
Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.
Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.

India and Pakistan
Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

Intelligence
Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.
Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.

International Relations
Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.
Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

Joint Operations
Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.
Hall, Col Brian K. "Air Expeditionary Access: The African Connection," no. 3 (fall 2003): 47–56.
Handy, Col Russell J. "Africa Contingency Operations Training Assistance: Developing Training Partnerships for the Future of Africa," no. 3 (fall 2003): 57–64.
Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.
Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.

Korean War
Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.

Latin American Region
Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.

Leadership / Management
Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.
Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.
Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

Logistics
Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.
Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.
Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU / NATO Defense Force Integration," no. 3 (fall 2003): 93–98.

Management / Organization
Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.
Myers, Gen Richard B. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.
Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Middle Eastern Affairs
Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.

Military Education
Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.
Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.

Military Technology
Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.
Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.

Military Thought
Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.
Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.
Myers, Gen Richard B. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.
Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Military Training
Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.
Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.

Missiles
Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.

National Security Policy
Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.
Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.
Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.
McCabe, Lt Col Thomas R. "The Chinese Air Force and Air and Space Power," no. 3 (fall 2003): 73–83.
Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.
Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.
Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.
Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.

National Strategy
Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.
Davis, Col (Dr.) Jim A. "The Looming Biological Warfare Storm: Misconceptions and Probable Scenarios," no. 1 (spring 2003): 57–67.
Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.
Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.

Nuclear Strategy
Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.

Officership
Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.
Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.
Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

Pacific
Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.

Personnel Issues
Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.

Planning
Deptula, Maj Gen David A., Col Gary L. Crowder, and Maj George L. Stamper Jr. "Direct Attack: Enhancing Counterland Doctrine and Joint Air-Ground Operations," no. 4 (winter 2003): 5–12.
Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.
Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.
Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.
Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.
Orr, Lt Col Dave L. "The Benelux Deployable Air Task Force: A Model for EU/NATO Defense Force Integration," no. 3 (fall 2003): 93–98.
Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

Political-Military Affairs
Tucker, Lt Col Mona Lisa D. "China and India: Friends or Foes?" no. 3 (fall 2003): 65–71.

Preparedness
Davis, Col (Dr.) Jim A. "The Looming Biological Warfare Storm: Misconceptions and Probable Scenarios," no. 1 (spring 2003): 57–67.
Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.

Principles of War
Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.

Procurement
Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.
Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.

Professionalism
Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.

Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.
Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.
Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

Regions
Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.
Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.

Roles and Missions
Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.
Ireton, Maj Collin. "Neglected Air Force Combat Missions" (vortices), no. 2 (summer 2003): 17–29.
Mets, Dr. David R. "The Not-So-Forgotten War: Fodder for Your Reading on the Air War in Korea a Half Century Later," no. 4 (winter 2003): 77–95.

Space Operations
Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.
Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.

Space Technology
Kuo, Lt Col (sel) S. Didi. "High Ground over the Homeland: Issues in the Use of Space Assets for Homeland Security," no. 1 (spring 2003): 47–56.
Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.
Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.

Special Operations
Teets, Hon. Peter B. "Developing Space Power: Building on the Airpower Legacy," no. 1 (spring 2003): 11–15.

Strategy
Echevarria, Lt Col Antulio J., II. " 'Reining in' the Center of Gravity Concept," no. 2 (summer 2003): 87–96.
Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.
Hammock, Col Gordon R. "Iraq, Preemption, and the Views of Poland, the Czech Republic, and Hungary," no. 3 (fall 2003): 84–92.
Luikart, Lt Col Kenneth A. "Transforming Homeland Security: Intelligence Indications and Warning," no. 2 (summer 2003): 69–77.
Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.
Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

Targeting
Freniere, Col Robert W., Cmdr John Q. Dickmann, and Cmdr Jeffrey R. Cares. "Complexity-Based Targeting: New Sciences Provide Effects," no. 1 (spring 2003): 95–100.
Haun, Lt Col Phil M. "Direct Attack—A Counterland Mission" (vortices), no. 2 (summer 2003): 9–16.
Krause, Lt Col Merrick E. "Attack Operations: First Layer of an Integrated Missile Defense," no. 1 (spring 2003): 101–12.
Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.
Weeks, Lt Col Michael R. "Cost-Benefit Economics: Enhancing National Security and Air and Space Power," no. 3 (fall 2003): 27–37.

Technology
Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.
Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.
Meilinger, Phillip S. "The Air and Space Nation Is in Peril" (vortices), no. 1 (spring 2003): 20–31.
Myers, Gen Richard B. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.
Newberry, Lt Col Robert D. "Latin American Countries with Space Programs: Colleagues or Competitors?" no. 3 (fall 2003): 39–45.
Pietrucha, Maj Michael. "Needles in the Haystack: Hunting Mobile Electronic Targets" (vortices), no. 1 (spring 2003): 32–40.

Terrorism
Davis, Col (Dr.) Jim A. "The Looming Biological Warfare Storm: Misconceptions and Probable Scenarios," no. 1 (spring 2003): 57–67.
Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

Theater Air Warfare
Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.

Theater Missile Defense
Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

Transformation
Dittmer, Col Kurt "Two-Lips." "Transformation from the War Fighter's Perspective" (pirep), no. 2 (summer 2003): 31–34.
Fawcett, Lt Col John M., Jr. "Training: The Foundation for Air and Space Power Transformation," no. 2 (summer 2003): 57–67.

Fought, Dr. Stephen O., Col O. Scott Key, and AWC Seminar Six. "Airpower, Jointness, and Transformation," no. 4 (winter 2003): 40–53.
Gabreski, Maj Gen Terry L., James A. Leftwich, Col (Dr.) Robert Tripp, Dr. C. Robert Roll Jr., and Maj Cauley von Hoffman. "Command and Control Doctrine for Combat Support: Strategic- and Operational-Level Concepts for Supporting the Air and Space Expeditionary Force," no. 1 (spring 2003): 113–24.
Kent, John. "F-35: The 'F' Stands for 'Future' " (pirep), no. 1 (spring 2003): 41–46.
Krisinger, Col Chris J. "Who We Are and What We Do: The Evolution of the Air Force's Core Competencies," no. 3 (fall 2003): 15–25.
Martin, Gen Gregory S. "US National Security Strategy and the Imperative of 'Geopresence,' " no. 2 (summer 2003): 35–48.
Myers, Gen Richard B. "Shift to a Global Perspective" (a word from the chairman), no. 3 (fall 2003): 5–10.
———. "Understanding Transformation" (a word from the chairman), no. 1 (spring 2003): 5–10.
Weaver, Lt Col Larry, and Col Anthony C. Cain. "Task Force Concepts of Operations: Transforming the USAF," no. 2 (summer 2003): 49–56.

Values and Ethics
Baskin, Lt Col Richard R., and Dr. Dean L. Schneider. "Learning as a Weapon System," no. 2 (summer 2003): 97–104.
Disler, Lt Col Edith A. "Words and Weapons: The Power of Discourse," no. 3 (fall 2003): 99–106.
Guillot, Col W. Michael. "Strategic Leadership: Defining the Challenge," no. 4 (winter 2003): 67–75.
Toner, Dr. James H. "Military OR Ethics," no. 2 (summer 2003): 79–86.

Weapons of Mass Destruction
Conley, Lt Col Harry W. "Not with Impunity: Assessing US Policy for Retaliating to a Chemical or Biological Attack," no. 1 (spring 2003): 69–79.
Davis, Col (Dr.) Jim A. "The Looming Biological Warfare Storm: Misconceptions and Probable Scenarios," no. 1 (spring 2003): 57–67.
Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

Weapons Proliferation
Kiziah, Col Rex R. "The Emerging Biocruise Threat," no. 1 (spring 2003): 81–94.

World War I
Frandsen, Dr. Bert. "America's First Air-Land Battle," no. 4 (winter 2003): 31–38.

World War II
Hughes, Dr. Thomas Alexander. "Normandy: A Modern Air Campaign?" no. 4 (winter 2003): 16–29.
Muller, Dr. Richard R. "Losing Air Superiority: A Case Study from the Second World War," no. 4 (winter 2003): 55–66.

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—Air University Manual 1, 1951

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