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# Aerospace Omnipotence?

What does "command of the air" mean for the twenty-first-century Air Force? Perhaps it is what Giulio Douhet, Frederick Sykes, Billy Mitchell, and others first envisioned, combined with Carl von Clausewitz's total-war concept. The result might be something like total "aerospace omnipotence." That concept—aerospace power eclipsing the fog and friction of war—may be unobtainable, but it is still an important one to consider in terms of what it takes to make aerospace power work today and in the future. For example, command of the air, or air superiority, really also implies things like leadership superiority, technological superiority, and organizational superiority. As the world has become increasingly connected and interdependent, so too has aerospace become a very complex web. Early airpower theorists conceived of command of the air operationally, strategically, and geographically. Today, however, maintaining the ability to exploit the aerospace environment while denying the same to the enemy involves other increasingly complex domains. As our capability in aerospace power grows, the challenge is to exploit that to the fullest extent possible without building an aerospace Maginot Line that fails to meet expectations.

What about the concept of leadership superiority? It is an interesting play on words that a primary leadership challenge of the twenty-first-century Air Force is the challenge to produce leaders—that is, leaders with the mental tools gained through the right educational and career experiences. This is the challenge in front of the USAF chief of staff's Developing Aerospace Leaders initiative. The piece by Dr. Smith represents some of the thinking going on to meet that leadership challenge.

In addition, our force has to be more air superior than many of us even want to consider—i.e., the air where bioweapons can be dispersed. It adds an interesting twist to "all-aspect" and "all-weather." There are sound arguments for technologically superior F-22 and Joint Strike Fighters to win the fight in and from the air. But the best fighter conceivable cannot dogfight bugs a fraction of the size of the period ending this sentence. And the circular error probable (CEP) required for micro air-to-ground attacks is inconceivable. The cover of this *APJ* issue is very busy—reflecting how our aerospace business with expeditionary forces is becoming increasingly busy over concerns about anthrax and other burgeoning threats.

The new century does not pose all that many new threats, just different and proliferating variations on old themes. In reaction, we have many leading-edge counterproliferation efforts (we need to invent the word *conliferation*). These efforts usually start with awareness. Both nuclear and nonnuclear weapons of mass destruction, like anthrax, make a head-in-the-sand approach stupid. The anthrax article by Drs. Johnson-Winegar and Davis paints an alarming picture of a very real air-superiority challenge that requires technological superiority in the form of various protective devices as well as products and practices from medical technology.

In a way, immunization against biological threats is similar to the organizational immunization behind the Expeditionary Air Force (EAF) concept. Injecting this new expeditionary management tool into our scheduling process helps ward off inefficient mobilizations, unfair commitments, and infectious sinking morale. The process is evolving and

improving as different ideas like those presented in General Cook's EAF piece are considered and implemented. How we are organized determines how we fight, and again, the link to the air is very real with a clean argument that organizational superiority is key to air superiority.

Bottom line: As we enter the twenty-first century, there is basically another element of difficulty added to the command-of-the-air equation, something we might call *aerospace omnipotence.* To go from air superiority to air supremacy to aerospace omnipotence—the ability to win the entire fight, achieving the desired effects and end states from aerospace—the force has to be superior not just in the air, but in the many realms interconnected with aerospace. □

# Ricochets and Replies

*We encourage your comments via letters to the editor or comment cards. All correspondence should be addressed to the Editor,* Aerospace Power Journal, *401 Chennault Circle, Maxwell AFB AL 36112-6428. You can also send your comments by E-mail to apj@maxwell.af.mil. We reserve the right to edit the material for overall length.*

## WHAT IS *AEROSPACE?*

I am concerned about the latest doctrinal approaches to *aerospace,* as evidenced by Air Force Doctrine Document (AFDD) 2, *Organization and Employment of Aerospace Power* (17 February 2000), and the Air Force Doctrine Center's essay "Five Myths about the Term *Aerospace,*" which seeks to explain it. The glossary of AFDD 2 defines *aerospace* as follows: "Of, or pertaining to, Earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance, and control of vehicles that will travel in both entities. (Joint Pub 1-02) *[Of, or relating to, the total expanse beyond the earth's surface.]* {Italicized definition in brackets applies only to the US Air Force and is offered for clarity.}"

Clearly, this new adjectival approach to *aerospace,* which emphasizes the separateness rather than the unity of *air* and *space,* departs significantly from one held by the Air Force since 1958, when Gen Thomas D. White spoke of "the operationally indivisible medium." The current chief of staff, Gen Michael E. Ryan, seemed to endorse that traditional definition in his introductory statement for the newly renamed *Aerospace Power Journal* in its Winter 1999 issue: "Gen Thomas D. White, former Air Force chief of staff, first publicized the term *aerospace* back in 1958, promoting the vision of a single indivisible field of operations from the Earth's surface to the stratosphere and beyond. Events worldwide show the significant reality of aerospace power in national security and global stability, and the new journal name reflects that reality as we enter the new millennium" (p. 2).

Not long after that, in May 2000, the secretary of the Air Force and the chief issued *The Aerospace Force: Defending America in the 21st Century: A White Paper on Aerospace Integration,* an authoritative statement of what they said was "the new Air Force Vision." According to this white paper, "Our Service views the flight domain of air and space as a seamless operation. The environmental differences between air and space do not separate the employment of aerospace power within them. Commanders of aerospace power will be trained to produce military effects for the Joint Force Commander (JFC) without concern for whether they

are produced by air or space platforms." It also includes a definition of *aerospace* that reflects the basic concept professed by the Air Force for decades: "Aerospace describes the seamless operational medium that encompasses the flight domain of air and space." This "seamless . . . medium"—*aerospace*—is a noun, of course, not an adjective, as in AFDD 2.

Maj Gen I. B. Holley Jr., one of the founding fathers of Air University's School of Advanced Airpower Studies, believes that "air power doctrine is the point of departure for virtually every activity in the air arm." That seems evident with respect to aerospace power in the pronouncements in the new white paper. Words *do* matter; concepts *do* matter; doctrine *does* matter—vitally and essentially.

So, is *aerospace* an adjective or a noun? If the *meaning* of words matters—if *doctrine* matters—then the Air Force must reconcile the differences between positions in its doctrine documents and the primary policy statements of its leadership.

**Lt Col Frank W. Jennings, USAF, Retired**
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First of all, we at the Air Force Doctrine Center appreciate this and any other forum to discuss these types of issues—it's at the heart of why we exist. As a direct reporting unit to the Air Force chief of staff, our organization works closely with Air Force senior leadership to ensure that our doctrine is clearly articulated. I respect the experience and thoughts of Lieutenant Colonel Jennings, a major voice in Air Force doctrine debates for many years. His letter gives us an opportunity to clarify our view of *aerospace,* a concept which we believe is widely misunderstood.

To ensure there is no confusion on this issue, I feel that it is important to emphasize that the definition of *aerospace* in AFDD 2 has two components—the first, which references "two separate entities," is the long-approved definition found in Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms.* By the rules of the doctrinal road, the Air Force is officially "stuck" with this definition until we can get agreement among the other services to change it. In the meantime, the parenthetical portion of the definition is the Air Force's adjectival clarification of the term. Adjectives describe things. Lieutenant Colonel Jennings references the *White Paper on Aerospace Integration,* which says that "aerospace *describes* the seamless operational medium that encompasses the flight domain of air and space" (emphasis added). The "Five Myths" essay, a thought piece that discussed the adjectival perspective further, also emphasized the seamlessness of air and space at the operational level of war. How exactly the AFDD 2 clarification "of, or relating to, the total expanse beyond the earth's surface" emphasizes, in Lieutenant Colonel Jennings's words, "the separateness rather than the unity of *air* and *space"* is not at all evident. The new clarification is, in fact, completely unconcerned with that distinction.

Lieutenant Colonel Jennings is exactly right. Words do matter; concepts do matter; doctrine does matter. It is precisely for these very reasons that the Air Force Doctrine Center invested time and effort to study the meaning of the word *aerospace* in all forums and facets and to propose a fresh characterization of the term that emphasized its oft-used adjectival sense rather than its traditional DOD meaning as a noun. Was this redefinition arbitrary? Hardly, AFDD 2—the document that encapsulates the adjectival context of aerospace—was approved by the Air Force chief of staff with the new clarification included.

A portion of the Air Force Doctrine Center's study drew from the successful example of the US Navy. That service operates in all environments but effectively and truly unites its disparate operational communities in the word *maritime,* which is consistently used as an adjective. The Air Force has not yet had the same success with *aerospace.* Why? Because when it has been used as a substitute noun for "air *and* space"—the juxtaposition of two environments—it has led naysayers (including blue suiters) to ridicule the Air Force for pretending

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# Strategic Implications of the Expeditionary Aerospace Force

LT GEN DONALD G. COOK, USAF

COL ROBERT ALLARDICE, USAF

COL RAYMOND D. MICHAEL JR., USAF

*Editorial Abstract: The expeditionary aerospace force effort is a promising new force-management framework to maintain the Air Force as a global-force provider. General Cook, who was at the helm of much of its development, and his coauthors introduce the engagement-spectrum model, which links small-scale commitments to those of major theater war and its force-reconstitution requirements. This model enables the measurement of force-commitment levels and can warn of unsustainable levels that require action and/or additional funding from decision makers. The authors challenge us to apply the model at all levels of the Air Force to stabilize our units, raise retention, and ensure our readiness for global engagement in the twenty-first century.*

THE DAWN OF THE twenty-first century casts a bright light on the United States military. Indeed, this nation's military capabilities are the envy of the world. Still, the experiences of the 1990s and the promise of challenges into the first decade of this millennium highlight the great advantages of each of our uniformed services and the tests they must endure—something especially true of the United States Air Force. As the Air Force struggles with a multitude of changes in this emerging era, it has begun to charter a path to become a more expeditionary, integrated, and effective instrument of power that our nation can flexibly apply as a seamless element of our joint war-fighting capability. Speaking of seamless operations, the Air Force has sustained a pace over the past nine years that indicates it is the service of choice for many operations that require rapid response with maximum force, while exposing the fewest number of American service personnel to danger. As airmen, we have grappled to meet the challenges of the post-cold-war era, during which time airpower has truly come of age and the Air Force has gone back to the future as an expeditionary force—capable of rapidly deploying, employing, and redeploying our great military might.

Several realities help provide an understanding of why the Air Force had to change: the geopolitical environment, the budget environment, and accelerating technological advances. By many accounts, the transition period that started with the end of the cold war will continue for at least another decade. So far, the national military strategy of engagement has successfully met the challenges of a world environment characterized by transition, turmoil, and uncertainty. Engagement within this environment, though, will continue to place strains on the US military as uncertain threats, both potential and actual,

drive responses across the entire spectrum of possibilities. At the same time, we do not anticipate any significant increase in force size to meet the demands of this challenging environment that has existed for 10 years now. Military budgets may fluctuate to some degree, but no one foresees a significant injection of funds to produce more equipment and personnel. The military must also deal with the reality of technological advances that continue to accelerate the rate of change in our world (although bureaucracies appear to fall further behind). Such rapid advances have compressed time to dramatic levels—we measure in seconds what used to be measured in weeks. Related to this phenomenon is exploitation of the electromagnetic spectrum: information, radio waves, TV, and so forth. Indeed, we may argue that technology has pushed us beyond three-dimensional warfare into a fourth and perhaps a fifth dimension: time and electromagnetism, respectively. Regardless of how we define the dimensions of warfare, we know that the military is executing the national military strategy of engagement within the context of these realities.

To continue to meet the demands of such realities and the national security needs of the United States and its interests abroad, decision makers will have to create new and innovative approaches to organize, train, equip, and employ aerospace power. The expeditionary aerospace force (EAF) effort constitutes an example of one such innovative approach because it recognizes the role of the Air Force as a global-force provider. Essentially, the EAF effort has provided the framework to organize, train, and equip by linking sustainable, small-scale commitments to major theater war (MTW) commitments and reconstitution/recovery requirements. We can understand this process within a strategic context by examining an engagement-spectrum model that offers the Air Force the framework to analyze the balance among all major phases of force application. It also establishes the basis for developing an investment and training strategy to meet the demands placed on the Air Force as a global-force provider. To fully appreciate the significance of the EAF, we must first explore the impact of making the Air Force a global-force provider, as well as the underlying justifications and implications. This article then briefly introduces the engagement-spectrum model and the implications of its application as we continue to embrace the uncertainty of the first decade of the new millennium.

## The Role of the Air Force as a Global-Force Provider

The strategy of engagement, combined with the decrease in force structure in the 1990s, places the Air Force at a capabilities cusp, creating tension between current operational demands and the requirement to retain robust capability to fight major conflicts. This tension both highlights and demands a new emphasis on the role of the entire Air Force as a global-force provider. For example, we use forces assigned to Pacific Command to meet the demands of European Command and Central Command. The implications of this practice on a smaller force are profound because the actions of one commander in chief (CINC) are magnified in their impact on other CINCs in terms of potential risk. This is true for nearly all Air Force assets—low density/high demand (LD/HD), mobility, space, combat aircraft, and support. Thus, engagement has placed a new management burden on the entire Air Force.

Recent operations in Kosovo helped magnify this point. Prior to Kosovo, the Air Force found itself well into EAF planning to level the tempo load on the entire force. The impact of Kosovo operations on EAF planning specifically, and the Air Force as a whole, was profound. At the height of its involvement, the Air Force had committed a larger proportion of its combat force structure than at any time in recent history—more than in Vietnam and more than in Operation Desert Storm. Additionally, going into this major surge in operations, the Air Force had already endured several years of engagement with

sustained small-scale contingencies (SSC) to multiple locations overseas. In almost every one of these SSCs, the Air Force had to operate out of either expeditionary or temporary bases. Practically speaking, this meant that Air Force units had to man these bases *out of hide.* This sustained engagement had already produced a downtrend in readiness, and the added weight of Kosovo operations merely exacerbated an already tough challenge. The forces the Air Force had to draw on to support the SSCs, while also posturing and executing the Bosnia campaign, came from all over the service. Each major command made significant contributions to these worldwide operations, and by the end of Kosovo, the Air Force's chief of staff was in a position to direct reconstitution or recovery for units, allowing them to recapture the skills required for full-scale war operations.

Embodying the challenge and lesson of the Kosovo operations, then, is the question, How does the Air Force execute its responsibilities within the strategy of engagement? That is to say, How does this service retain its war-fighting capability so that it can *respond* (one pillar of the national strategy) to serious, *direct* threats to national interests while *shaping* the current environment and preparing for a less-certain future?

The problem amplified by the Kosovo operations—the one that the Air Force was already grappling with during initial efforts to build toward an EAF—poses serious questions concerning the Air Force's Title 10 responsibilities to organize, train, and equip. The EAF construct helps provide the framework to address these questions.

The EAF addresses the high demands that the strategy of global engagement places on the Air Force as a global-force provider. Current demands include maintaining high deployment tempos and multiple, sustained forward operating locations while retaining rapid crisis-response capability—and the ability to conduct two nearly simultaneous MTWs. These demands stress our people and assets, resulting in lower retention rates, decreasing readiness rates, increasing cannibalization rates, and lower mission-ready rates. The EAF steps up to a dual challenge: sustaining our aerospace assets and retaining our people.

### *Expeditionary Aerospace Force*

As the sun set on the turbulent decade of the 1990s, the Air Force embarked on a bold venture to embrace the challenges presented by the strategy of engagement. The Air Force initiated the EAF implementation effort to position the service to aggressively embrace the new era by creating change in its structure, culture, and operational employment.

The EAF embodies the Air Force vision to organize, train, equip, and sustain its total force—active, Air National Guard, and Air Force Reserve—to meet the security challenges of the twenty-first century. It addresses these challenges through enhancing sustainability, readiness, and responsiveness, and by fostering an expeditionary-warrior mind-set. The fundamental objective of the EAF is to enhance the current operational capabilities provided by the Air Force to its clients—the war-fighting CINCs—while sustaining a viable force that can also provide those capabilities in the future.

The EAF is about truly embracing and understanding the concepts and implications of engagement and presence articulated in *Global Engagement: A Vision for the 21st Century Air Force.* The EAF is a proactive move away from the cold-war Air Force, reaffirming the vital role aerospace power plays across the full spectrum of conflict in support of the national military strategy. It recognizes the growing tendency to employ aerospace power frequently and over sustained periods as a part of that strategy. It also acknowledges that the demand for aerospace power is driven by its unique characteristics of range, speed, flexibility, and precision.

### *Force Management*

At its core, the EAF is about the structural and cultural changes that create more effective force-management tools. A key objective in-

volves understanding what the limitations of Air Force resources are and how overcommitting them to meet requirements today can result in less capability to meet essential requirements tomorrow.

The most talked-about change under EAF is the aerospace expeditionary force (AEF)—specifically, the construct by which a pair of AEFs defines the level of deployment that our combat and combat-support units can sustain. A pair of rotating, aerospace expeditionary wings (AEW), one of which is on call at any given time, provides the punch in our crisis-response capabilities.

The AEF force-management tool looks beyond simple aircraft counts to measure tempo by addressing the many deployments that involve only combat-support forces—known as expeditionary combat support. We also try to include metrics for the number of forward operating locations, which can stress some forces just as much as the number of aircraft deployed. A going-in objective entails controlling home-base tempo because it is critical to long-term retention and readiness.

The AEF force-management tool complements two existing tools for deploying forces. First, Air Mobility Command uses mobility commitment lines to control and measure the tempo of tanker and airlift forces. Second, both the Air Force and the joint community use the Global Military Force Policy (GMFP) to measure and try to control the demand for our LD/HD assets such as airborne warning and control system (AWACS), U-2, and special-operations aircraft.

We must protect the forces that accomplish the Air Force's Title 10 task to train, organize, equip, and sustain. MTW plans often assume that we will surge these forces forward and recover them later. However, under the stress of multiple rotational deployments, such a surge becomes counterproductive. Using these forces for deployments interrupts sustainment actions on MTW capabilities and delays efforts to recover, refurbish, and retrain returning forces. We often overlook this hidden cost of business—extremely important to sustaining a viable force—as we assess our ability to sustain increased numbers of forces forward or assess force-structure cuts using only MTW scenarios.

Finally, although not specifically addressed by these management tools, nondeploying capabilities remain critical to expeditionary operations. Fixed assets that provide support to deployed forces, such as satellite-control stations, logistics depots, intelligence-production centers, long-haul communications, and so forth, are vital to reducing the footprint required to deploy forward.

By the conclusion of 1999, the Air Force had made significant progress on the EAF journey toward becoming a more viable service by initiating the following efforts:

- Restructuring processes to smoothly make the transition across the spectrum of military operations.
- Defining sustainable engagement: the levels of deployment/tempo our forces can sustain.
- Creating more effective force-management tools.
- Developing methods to determine when commitments exceed sustainable levels (surge) and establishing processes to manage this.
- Developing methods to plan for reconstitution.
- Developing methods to provide predictability and stability for Air Force members as an essential part of the service's mission—sustaining and retaining the force while meeting joint-force tasks.
- Emphasizing light and lean forces with a smaller forward footprint; more lethality, requiring less force for a desired effect; and rapid response, reducing demand for forward presence.
- Managing deployment and other requirements to keep within sustainable levels.

As the EAF concept evolves (it is a journey, not a destination), new aspects of the EAF have already helped shape how the Air Force responds to its role as a global-force provider and are laying the groundwork for innovative improvements for operating in the engagement environment. One major theme resonating from the experiences of operating in a heavily engaged environment is that the Air Force must have effective processes to manage the transition from SSCs up to MTW. Unfortunately, many models fail to address the complete spectrum to which the Air Force has had to respond. The engagement-spectrum model helps provide a framework for analyzing the relationships among different phases of engagement (from a strategic perspective) and helps illustrate the contribution of each element of the total Air Force to our struggle to meet the demands of a national security strategy at all levels.

## The Engagement-Spectrum Model

Typically, we think of the spectrum of conflict as a linear transition from peace to war and then back to peace. The engagement spectrum (fig. 1) reflects the Air Force's experiences with the reality of engagement, which adds a baseline of long-term rotational deployments. Simplistically, we turn the traditional spectrum on its side and account for a continuum of long-term rotational requirements. The vertical axis of the model, then, represents a level of commitment for the Air Force in terms of resources, while the horizontal axis represents time. Hence, recognizing that in a strategy of engagement we always have a certain number of baseline forces engaged, the model allows for an increase in the level of commitment up through surges into actual war. Unique to this particular model is recognition that there must be a seamless transition back to some postconflict steady-state levels and that this transition requires time for recovery and/or reconstitution.

(At this point, one should note that although the model lends itself to discussion of Air Force commitment levels as a whole, one can also apply its key points to almost every unit and every functional area. We all have levels we can sustain indefinitely; thus, exceeding surge points will drive some cost. For example, the mobility community has a level

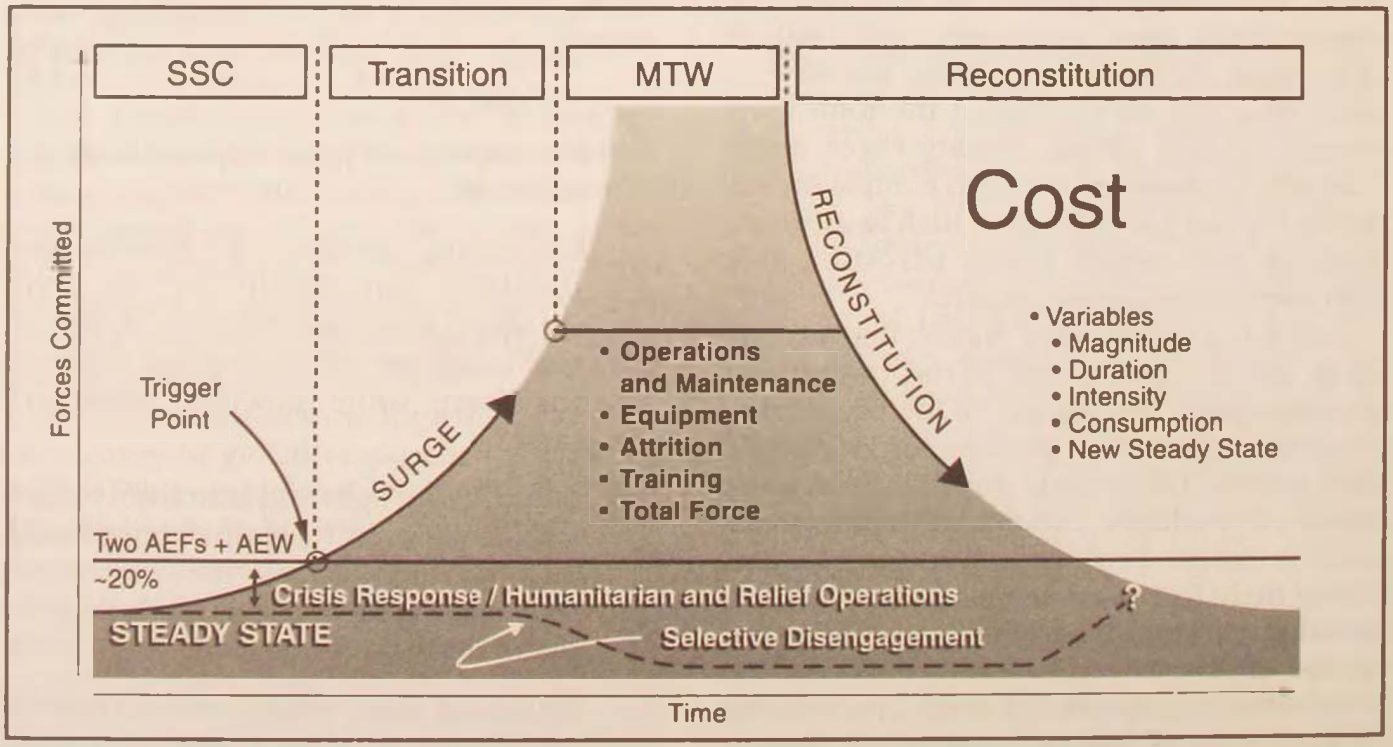


**Figure 1. The Engagement-Spectrum Model: EAF across the Spectrum**

of commitment it can sustain indefinitely, and that level varies for each major weapon system. The LD/HD weapon systems, such as AWACS, also have sustainable commitment lines. As a percentage of their specific force [these limits vary], the important point for this model is that each system can identify its particular key points.)

### *Sustainable Engagement to Meet Small-Scale Contingencies*

The first notable characteristic of the model is that it attempts to reflect the ongoing commitment to the strategy of engagement. Although the model measures commitment in terms of AEFs, this commitment sits on top of fixed forces such as those dedicated to Korea. Today, we use AEFs as the force-management tool to define our level of sustainable engagement. We can meet the total operational commitment with forces from the two tasked AEFs and an on-call AEW, along with mobility and LD/HD assets operating below their defined surge lines. We can sustain this commitment over time, provided that we address recurring needs of the force—including personnel, maintenance, and equipment. Sustainable engagement includes a level of crisis response—an on-call AEW—that provides a cushion to preclude having the force surge every time a crisis occurs.

What defines the level that we can sustain indefinitely? It depends to a great degree on the mission of the particular weapon system, unit, or type of equipment. Again, at the broadest level, the Air Force says it can task no more than about 20 percent of its combat air forces for operational requirements without significantly impairing its ability to prepare for future major engagements. That is the balance point, which the Air Force can—and should—define for each of its functional areas.

From the perspective of the 1990s, with minor exceptions, the forces in two AEFs and the on-call AEW could have handled all of the contingencies between Desert Storm and Kosovo without requiring a major surge. Those events would have fallen in the crisis-response zone for most assets. However, in Kosovo the Air Force's engaged forces did reach a level of effort nearing commitments envisioned in theater operational plans. When that happens—between the trigger point and full mobilization—we must consider other sustainment options, including presidential selective-reserve call-up or full mobilization.

### *Trigger Point*

The model raises the obvious question of what happens when we exceed the sustainable steady-state line. At least three major considerations should begin after commitments pass this so-called trigger point: an acknowledgment that (1) the force is in surge operations (which we cannot sustain indefinitely); (2) the force is likely in a transition to MTW levels of commitment; and (3) definite costs associated with passing the trigger point should generate several actions to initiate recovery/reconstitution efforts. Let us look at each of these considerations in greater detail.

Surge operations begin when tasks exceed sustainable Air Force capabilities. Force-management tools provide trigger points to identify the time when requirements exceed sustainable commitment levels. Two AEFs and an AEW provide the trigger(s) for combat and combat support. Similarly, the GMFP governing LD/HD assets (AWACS, etc.) and mobility commitment lines defines trigger points for those forces. Another logical trigger should occur any time we tap into our train and organize, equip, or sustain forces for operational tasking. Note that surge is not necessarily a result of a single contingency. In fact, our experiences in the past decade showed that surge is an accumulation of contingency commitments that can come from a single event (e.g., Kosovo) or a number of smaller contingencies. In theory, commitments can build to an MTW level of effort but hopefully will level off well short of that mark.

Acknowledging that the level of force commitment may be approaching MTW levels is not in any way meant to make a political statement. From a military perspective, it is meant

to serve notice to planners that at a particular level of commitment, the possibility exists that we will accept risk in other operational plans. This recognition may lead to considering alternative courses of action, or it may initiate activities to begin selectively disengaging from some other SSCs. However, Kosovo showed that selective disengagement can be complicated by CINCs who want to selectively *increase* engagement as a risk-management measure. As mentioned earlier, it is certainly possible to find ourselves at MTW levels of commitment in terms of force structure deployed or munitions expended without actually engaging in a major conflict. Because the force is in surge, multiple implications can immediately arise, such as initiating a presidential call-up of reserve forces, working toward an exit strategy, increased monitoring of other planning activities, and so forth.

The third consideration—one that often goes unnoticed—is that once the trigger point is exceeded, either through levels of forces committed or through consumables expended, a definite cost arises. As the model indicates, costs vary, depending on many things, such as magnitude, duration, and so forth, of the contingency. Also, costs come in many forms, direct and indirect, and can include those for the actual operations, such as fuels, munitions, and equipment. Other costs may include those for sacrificed training (which increases future risk to operations plans) and those associated with employing the total force beyond what employers consider acceptable. All of these potential costs and others should enter into the equation as we calculate the impact of passing the trigger point, which must also immediately initiate activities to generate long-lead item reconstitution and recovery efforts.

### *Reconstitution*

Any time an asset surges past its trigger point, some cost is incurred, and planning for reconstitution must begin simultaneously with the start of surge operations (fig. 2). Reconstitution efforts will continue beyond the end of the contingency operation. Factors to consider in reconstitution planning include levels of consumables and munitions expended; training lost; impact of personnel retention and attrition rates across the total force; and postcontingency, steady-state operational re-

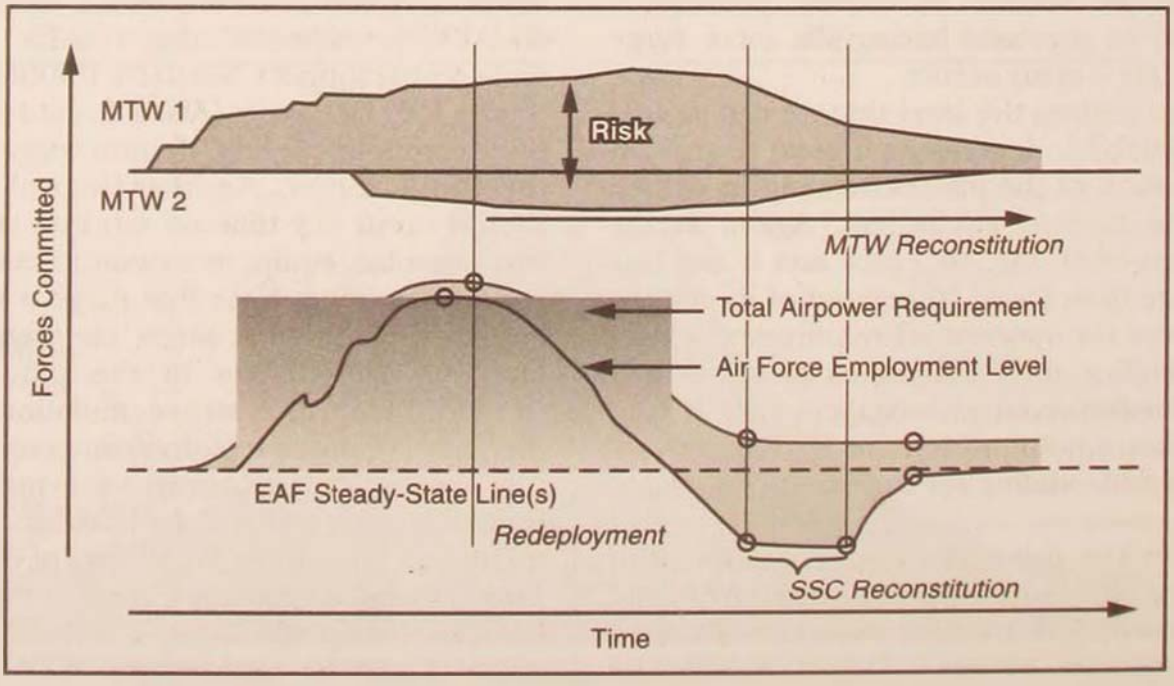


**Figure 2. Reconstitution for Engagement and MTWs**

quirements. Note that any time the force begins to surge, one must disengage below the sustainable engagement level for a period of time to reconstitute the force. Additionally, after a surge, it is critical that the exit strategy return the total Air Force commitment back to a level it can sustain indefinitely. At this juncture, one must consider how neglect of reconstitution and recovery efforts would affect the sustainable engagement level in the future.

### *Engagement Model Applied*

Operations in Kosovo serve as a case study for the application of the engagement-spectrum model. Air Force assets going into Kosovo were committed somewhere around the 10 percent level, and as operation requirements increased, the Air Force surged well past the trigger point. The Air Force executed this operation—the first major contingency with the post-cold-war force structure—while a significant portion of its assets was already engaged in other parts of the world. Finally, after Kosovo, the Air Force had to go through a form of recovery or reconstitution while still engaged—with a goal of returning to a level of commitment it could sustain. By applying the concepts presented in the engagement model, the Air Force could measure and articulate the impacts of the Kosovo operations, in addition to other worldwide commitments, and rapidly build and execute the plan to recover.

So, the engagement-spectrum model helps us understand the challenges that the strategy of engagement has placed upon the Air Force. Additionally, the model provides an opportunity for each element of the Air Force to identify with the contribution it can make to ensure cohesive operations across the entire spectrum of military operations, including critical aspects of reconstitution. Lastly, the model helps shape thinking about how the Air Force will have to operate as an effective force toward the end of this decade. The model's success does not depend upon how well it fits the past but on how well it fits the future. Extending the strength of the Air Force into the next decade requires bold vision and the strength to develop innovative methods.

Looking to the future, the Air Force will still have to respond rapidly with its forces, anywhere in the world. In fact, one of the main assertions the Air Force makes today is the ability to project power worldwide in a matter of hours. In addition to global-attack missions, the Air Force is working toward a vision of delivering desired effects within 48 hours of an execution order, given 24 hours' strategic warning. We must build this ability to continue to compress time upon a solid understanding of the linkage with the desired outcome of the application of military force. We say that we are an effects-based force and that we apply capabilities to create the effect, so comprehending the demands of sustained worldwide operations as a global-force provider is crucial.

The basic elements of Air Force capabilities include people, equipment, and munitions, fused through doctrine, training, and command and control systems to create flexible capabilities. Applying these capabilities through comprehensive campaign plans to create desired effects is the role of the war-fighting CINCs. Preparing these basic elements and developing the construct that balances day-to-day operational demands with potential wartime demands fall under the responsibilities of the US Air Force. Initial efforts to identify trigger points and sustainable levels of engagement must continue. Additionally, planning systems must refocus efforts on the ability to transition from small-scale operations, to surge, to MTW, and back through reconstitution to small-scale operations. Current planning systems are much too unresponsive to accomplish the demands of the Air Force today, not to mention the Air Force at the end of this decade.

The Air Force's effort to make the transition into a fully capable expeditionary force has yielded many benefits. It has also raised multiple questions for further study: Do the Air Force and the Department of Defense have the planning systems today that can adapt to changes required in an accelerated world pace? Are we adequately resourced to work across the spectrum? Does our invest-

ment strategy match the demands we will have to meet? Does the acquisition process allow for the adaptations required while operating across the spectrum?

Clearly, basic Air Force capabilities will not change: people, equipment, and munitions fused with doctrine, training, and command and control systems. We may change the capabilities we provide to the war-fighting CINCs to create the effects, but our ability to manage these basic elements innovatively—to increase the synergistic effects we expect from airmen—will set the tone of military operations for the next two decades. □

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*Who controls the Rimland rules Eurasia; who rules Eurasia controls the destinies of the world.*

—Nicholas Spykman, 1942

# The Anthrax Terror

## DOD's Number-One Biological Threat

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*Editorial Abstract: The chance that our armed forces will encounter biological weapons has increased dramatically since the dissolution of the USSR. Drs. Johnson-Winegar and Davis give us an in-depth tutorial on anthrax, the predominant bioweapon threat, and they provide clear rationale for our needing a viable vaccination defense.*

TODAY THE US military faces a variety of threats around the world, ranging from nuclear ballistic missiles to information warfare. The ability to conduct biological warfare (BW)—to employ biological agents like anthrax as weapons—lies within our adversaries' threat arsenals. This increasingly discussed threat is not as readily appreciated and understood as kinetic-energy threats but presents no less and perhaps an even more daunting challenge to the Department of Defense (DOD) and the nation. The sobering reality is that this threat impacts our national security, and

its effects could dramatically change our society.

The relative ease with which biological weapons can be obtained, along with other changes in the world, sets the stage for a different type of warfare in the twenty-first century. BW may reshape the way nations fight wars. If used on a massive scale against the civilian populace, BW could redraw the patterns of our society as people become increasingly concerned about being victims of this silent and deadly mode of warfare. Scientists predict the next several decades will pose challenges as current BW technology evolves into futurist biological weapons such as binary BW agents, stealth viruses, and malicious designer genes. In fact, biological warfare capabilities are probably where nuclear weapons were in the 1940s.[1]

Underscoring how seriously the US military views biological weapons in general and anthrax in particular, the Joint Chiefs of Staff in 1996 declared anthrax the number-one biological-weapon threat to our military forces.[2] Why is DOD so concerned about biological warfare and particularly anthrax? What can be done to mitigate this threat? Knowing that all vaccines have potential risks, is DOD justified in having a goal of vaccinating one hundred percent of the military against anthrax, or should alternative solutions be adopted?

## Why the Concern about Biological Warfare?

Millions of defense dollars are currently funding projects to protect our military forces and nation against potential BW attacks. During the last 75 years, several international treaties and arms control agreements have been put into place, yet the number of nations with BW programs has not seemed to wane.[3] Based on the incidence of past use of BW in the twentieth century, globalization, technology transfers, and an increasing interest in BW, our military forces should expect and be prepared to encounter and cope with BW use during the twenty-first century. The world is changing, and these changes are escalating the BW risk. Today, rogue states and some terrorist groups are able to overcome technological barriers more easily due to the increased flow of information and access to technologies that were heretofore unavailable. Along with nuclear and chemical arms, biological weapons are part of an unholy trinity of weapons of mass destruction (WMD). Although chemical warfare (CW) and BW programs require different equipment and expertise, they do have several common features. Both are considered inexpensive weapons that can inflict massive casualties, and both are usually most effective when inhaled. If given advance warning, military personnel can don protective masks and suits that will protect them from both chemical and biological weapons. Neither type of threat destroys property like conventional or nuclear weapons. As a result of these and other factors, countries that have CW programs usually have BW programs. Similarly, countries with BW programs are likely to have CW programs. Since chemicals have been used more widely as weapons, the past use of BW has often been overlooked. Yet, the historical incidence of BW (including anthrax) and the emergence of several other factors make it an increasing threat for our near and distant future.

### *BW Use in the Past*

During the US Revolutionary War, Gen George Washington received reports that the British were spreading smallpox among colonial troops. At first Washington gave little credence to these reports until his troops began to come down with the dreaded disease.[4] At a time when smallpox was killing 16 percent of the people it infected, Washington had to make some tough decisions if he was to preserve the colonial army. His only apparent option was to order mandatory inoculation of his forces,[5] which he knew at the time would cause a mortality rate of 0.33 percent (one per 300 inoculated would die). On 6 January 1777, Washington gave the order for the colonial army to be variolated. Variolation involved the intentional inoculation of smallpox or-

ganisms into the body, a more dangerous procedure than vaccination with cowpox virus ("smallpox vaccination") developed a few years later in 1796. [6] Although data is not available on the number of deaths caused by inoculation, most of the people who underwent variolation survived and were protected from smallpox.

Biological warfare was used in World War I by the German military, who recognized the mule and the horse as important to the Allies for moving equipment. Accordingly, the Germans embarked on an antianimal BW campaign. They achieved their most notable success when they infected forty-five hundred mules and horses belonging to the Allies in Mesopotamia with glanders.[7] Additionally, the Germans are known to have set up a laboratory in a private house in Chevy Chase, Maryland, where large quantities of anthrax and glanders organisms were grown. A German agent, Capt Frederick Hinsch, used these to inoculate horses in Baltimore, Maryland. An extensive network of German agents in the United States injected horses, mules, and cattle with glanders and anthrax at the stockyards just before the animals' departure to the European theater.[8] The Germans were also accused of covert BW attacks on humans, allegedly using cholera in Italy and plague in Saint Petersburg, Russia.[9]

The Japanese Imperial Army experimented with over 16 biological agents as tools of warfare between 1932 and 1945. This took place in numerous locations in Asia, where the Japanese experimented with and employed multiple types of biological-weapon delivery systems. It is estimated that some 10,000 Chinese prisoners, US prisoners of war, and British detainees were killed by some of the most gruesome human experimentation in history.[10] The Japanese used BW agents such as anthrax, plague, tularemia, and smallpox to gauge effects and to help them understand how to weaponize such diseases. [11]

Dr. Ken Alibek, the former deputy director of Biopreparat and chief scientist of the Soviet offensive biological warfare program, defected to the United States in 1992.[12] Alibek has alleged that the Soviets employed biological warfare during World War II. In his book *Biohazard,* he states that there is evidence tularemia was used by the Soviet troops to help stop the German panzer troops in the Battle of Stalingrad. The resulting tularemia outbreak may have halted the Nazi advance, but the Soviet troops also developed the disease because of what Alibek suspects was a sudden change in wind direction. Over a hundred thousand cases of tularemia were reported in the Soviet Union in 1942, a tenfold increase in incidence experienced in 1941 and 1943. Seventy percent of the cases were the respiratory form of the disease, which is the form that would have been expected from a biological weapon rather than a natural outbreak of the disease.[13]

From 1974 to 1981, the USSR was actively using chemical/biological warfare (CBW). *The Textbook for Military Medicine,* published in 1997, states that there were 10,923 deaths from CBW use by the Soviets from aircraft spray, rockets, bombs, and other methods. Those were the result of 497 CBW attacks in Afghanistan, Laos, and Kampuchea (Cambodia).[14]

The Soviet Union developed a huge offensive BW program during the 1970s and 1980s. "Secret" cities were built as part of a communist strategy to keep a massive, clandestine program. While the US offensive BW program (1942–69) focused on BW agents that were curable, the Soviets were constantly striving to develop agents that were difficult to treat. Not wanting to repeat the incident at Stalingrad where Soviets were infected by their own weapons, they began to formulate a strategic focus—targeting deep strikes into the United States. As recently as 1988, BW agents such as anthrax, plague, smallpox, and an Ebola-like virus were earmarked for placement in SS-18 missiles pointed at major US cities. An SS-18 could carry enough anthrax to wipe out New York City.[15]

Not only are states willing to deploy such unconventional weapons, but now terrorist groups have gained an interest in them. The Aun Shinrikyo cult is best known for its nerve

(sarin) gas attack in the Tokyo subway on 20 March 1995. Fortunately, the lack of sarin purity and the Aun's poor delivery mechanisms limited the effects to 12 deaths and fifty-five hundred casualties. What is not generally well known is that the group also had manufactured biological weapons and attempted to use them. They tried to deploy anthrax on four occasions and botulinum toxin at least four other times.[16] One planned target of a botulinum toxin attack was the US naval base in Yokosuka in April 1990.[17] Fortunately, none of these attacks was successful; otherwise, the casualties could have been in the tens or even hundreds of thousands.

*World Environment*

The Department of State has identified seven states as sponsors of international terrorism. These state sponsors include Iran, Iraq, Syria, Libya, Cuba, Sudan, and North Korea.[18] Even more alarming, several of these states are also believed to have a biological warfare capacity.[19] The 1980s and 1990s brought an escalation in the number of nations deciding to develop their own biological-weapons program. Most conspicuous among other states often mentioned as possessing an offensive BW program are China, Russia, and Israel.[20] Russia's declining economy has also caused other international concerns as Russian scientists and workers who were previously employed in the BW program may decide to work for other countries.

The actual and potential movement of highly skilled professionals (the so-called brain drain) from the previous Russian and South African offensive BW programs is alarming.[21] At its height, the Soviet BW effort had as many as 60,000 people working on different aspects of the program.[22] A good number of those individuals have marketable skills that could be used by countries eager to develop their own program. Many of the former Soviet BW scientists are either unpaid or receive only minimal pay (about one hundred dollars per month), making relocation to another country appear lucrative.[23] Likewise, the South Africa BW program began receiving scrutiny under President F. W. de Klerk in the early 1990s, which led to the firing of numerous scientists working the program. This kind of activity only adds fuel to rogue states seeking South African scientists to assist with their countries' development of programs.[24] South Africa recently declared it no longer has an offensive BW program and that all its BW activities are related to defense.

The Internet is another source of ready information for those bent on obtaining a biological weapons capability. Heretofore, one of the greatest barriers to a full understanding of the acquisition, production, and deployment of BW has been a lack of technical knowledge. The Internet now provides a massive repository of information on BW from hundreds of sources. BW exercise scenarios used by governmental agencies on the Internet supply ideas to terrorists on how to effectively deploy BW. Books are available that describe how to obtain, grow, and deploy BW agents such as anthrax, ricin, and botulinum toxin. Other unclassified information goes into great detail discussing the benefits or shortfalls of particular BW agents.

Along with the change from a bipolar to a multipolar world and the proliferation of information through the Internet, terrorists' increased interest in biological weapons has DOD concerned.[25] The trend of terrorism might be captured in two words—*massive lethality*.[26] While the number of terrorist events was down in 1999, such events are involving larger numbers of people and more fatalities per event. Examples of this trend include the murder of 270 people aboard Pan Am Flight 103 in 1988 and the US Embassy bombings in Kenya and Tanzania where 224 people were blown up in 1998.[27] Additionally disturbing in the terrorism trends is the evolution toward transnational groups.[28] The Osama bin Laden or the Aun Shinrikyo organizations serve as operative examples. They have or have had a massive international network capable of exporting terrorists around the globe in pursuit of their political objectives.

## What Is Anthrax?

Anthrax is one of the oldest recorded diseases known to man. The disease is endemic to wild and domestic animals, primarily herbivores such as cattle, horses, and sheep, but it also infects other animals including cats, monkeys, and humans. Naturally occurring anthrax in humans is a disease acquired by contact with infected animals or contaminated animal products such as hides, and it generally manifests itself as cutaneous lesions. It is thought that the fifth and sixth plagues the Egyptians suffered in approximately 2000 B.C. were due to an anthrax infection. During the Middle Ages, the disease, called Black Bane, ravaged the European countryside, killing scores of cattle and sheep.[29] Inhalational anthrax is a new form of the disease that emerged in the industrial age due to aerosolized particles in wool mills.

In 1876, Robert Koch definitively proved that *Bacillus anthracis* was the causative agent for disease. His development of "Koch's postulates" through experimentation with anthrax provided medical practitioners and scientists with a method to prove that a specific bacterium caused a specific disease.[30] *Bacillus anthracis* was not only the first bacteria to be proven to cause a disease, it was also the first bacteria (as opposed to a virus) against which a vaccine was developed.[31] In 1796, Edward Jenner created the first vaccine for a virus, smallpox, but it was nearly one hundred years later before the first vaccine against a bacterium was developed.[32] In 1881, Louis Pasteur created the first bacterial vaccine against *Bacillus anthracis*.[33]

Although the United States experienced approximately 130 cases of anthrax each year in the early 1900s, this has been reduced to about one case per decade since the 1970s.[34] While rare cases of cutaneous anthrax are reported in the United States, no case of inhalational anthrax has been reported in the United States since 1978.[35] Much of the decrease is probably due to vigorous livestock vaccination programs in endemic areas and human vaccination of high-risk individuals.[36] The largest human epidemic occurred in Zimbabwe in 1978–80, resulting in more than six thousand cases, of which almost all were the cutaneous form.[37]

Anthrax infection in humans comes in three forms: cutaneous, gastrointestinal, and inhalational.[38] These forms of the disease also describe how a person is exposed to the *Bacillus anthracis* spore. Hemorrhagic meningitis can be a secondary condition in any of these forms of the disease if the disease progresses to bacteriemia.[39] The cutaneous form of the disease is the most common form, making up 95 percent of all occurrences.[40] Without treatment, one in five people would die from cutaneous anthrax. With treatment, virtually a hundred percent survive.[41] The gastrointestinal form of the disease is much more severe and may result in a fatality rate of 50 to one hundred percent of untreated persons.

Inhalational anthrax is the form most likely to be seen in a BW attack, and it approaches a 100 percent fatality rate if treatment is not administered almost immediately.[42] If treatment begins 48 hours after symptoms from inhalational anthrax, the mortality rate can still be as high as 95 percent.[43]

An incubation period (without symptoms) would range from one to six days.[44] Individuals would initially manifest nondiscrete flulike symptoms (e.g., fever, headache, muscle ache, etc.). This period may last 24 to 72 hours, followed by a few hours of "improvement." The terminal stage is an almost precipitous decline resulting in death within hours.[45] None of the available treatments can slow the incidence of mortality significantly once the initial symptoms appear.

*Bacillus anthracis* is a large, Gram-positive bacterium found in many soils around the world and can survive in spore form for decades. There have been cases where the spores have been found still alive after two hundred years.[46] Although some strains have a greater virulence than others, they all must have certain characteristics to cause disease.

In its vegetative (growing) form, the bacillus has a protective capsule that keeps a human's

immune system from killing it.[47] Disease-causing strains of anthrax bacteria are characterized by three protein components that they produce.[48] These three components (protective antigen, lethal factor, and edema factor) combine to produce the two deadly toxins (edema toxin and lethal toxin) that cause damage to the human body.[49] In experimental animal studies, once toxin levels reach a critical threshold, death occurs even if antibiotics are used to eliminate the bacteria.

Thirty-three different strains of disease-producing *Bacillus anthracis* have been tested in guinea pigs, seven strains in rabbits, and four strains in rhesus monkeys; all testing in these animals confirms that the same toxins produce disease in animals as well as man.[50] In laboratories *Bacillus anthracis* can be grown in such a way that the protective antigen can be isolated. This technique has helped scientists to develop the current Food and Drug Administration (FDA)-approved vaccine that utilizes this key disease-mediating protein (protective antigen) to develop antibodies to prevent the disease.

## Is DOD Justified in Labeling Anthrax as the Number-One Biological Threat?

Millions of dollars from the DOD budget are currently being spent to mitigate the potential effects of biological weapons. Since anthrax is number one on the list, it receives a large share of the counter-BW budget dollars. If DOD is focusing on the number-two threat, rather than on what is the most likely BW-agent threat to our nation and military, we could be extremely vulnerable. Several factors support DOD's decision to focus on anthrax, including the intermittent use of anthrax in the twentieth century, the unique benefits of *Bacillus anthracis* as a BW agent, and the proliferation of BW programs worldwide with anthrax as their core biological agent.

## Anthrax: The Biological Weapon of the Twentieth Century

During the first half of the twentieth century, there have been a number of attempts at using anthrax as a weapon. Besides the previously mentioned uses of anthrax by the Germans in World War I and by the Japanese from 1932 to 1945, other countries saw value in having anthrax as an offensive weapon. During World War II, the United States and Britain started their offensive biological warfare programs, and both came to recognize *Bacillus anthracis* as one of several primary biological agents for possible warfare use. There is no record of any US or British use of biological weapons, but work was done to attempt to weaponize a variety of BW agents.

In 1969, President Richard M. Nixon made an international announcement that the United States would unilaterally disband its offensive BW programs and destroy all its BW weapons.[51] Additionally, in 1972 other nations joined with the United States and the USSR in signing the Biological Weapons Convention (BWC), which prohibited the research, production, or use of BW. All was well until the Sverdlovsk Anthrax Incident.

On 2 April 1979, an accident involving *Bacillus anthracis* occurred at a secret biological-weapons facility in the town of Sverdlovsk (now Yekaterinburg) in the USSR.[52] Unlike the Chernobyl nuclear meltdown where the accident could be seen and heard for miles, this accident happened silently in the early hours of the morning when an employee did not properly replace a filter on an exhaust vent. As a result, between 64 and 104 people died from anthrax infection.[53] The cover story was that these people died from infected meat. The USSR denied it was a BW accident until 13 years later when President Boris Yeltsin admitted the infection came from the escape of anthrax from a BW production facility, confirming the fact that the USSR had been in direct violation of the BWC. The Communist official in charge of the cover-up in 1979 was none other than President Yeltsin. The US biological program had only

two recorded cases of accidental anthrax infections (1951 and 1958), and both were fatal.[54]

Although Saddam Hussein was ready to use anthrax in the 1991 Gulf War,[55] his lack of use might lead some to believe the anthrax threat was exaggerated. One study done by the Office of the Secretary of Defense (OSD) modeled the scenario of Iraq's using its weaponized anthrax by spraying it from one of Saddam's dedicated F-1 Mirage aircraft equipped with spray tanks. In ideal weather conditions, an estimated 76,300 deaths would have been suffered by US forces within the first few days of the Desert Storm ground campaign. This would have devastated our forces by killing 24 percent of the 320,000 US soldiers in the region. However, if they had all been vaccinated, only 122 deaths might have resulted.[56]

After the nerve gas attack in Tokyo in 1995, extensive investigations revealed that Aun Shinrikyo had acquired, produced, and weaponized *Bacillus anthracis*. On four repeated occasions (1990–95), the cult tried to spray the bacterial agent over Tokyo.[57] Fortunately, they were not successful in inflicting mass casualties. A few deaths could have been caused by their anthrax release and would probably have never been discovered due to the large number of unexplained deaths that routinely occur in large cities. These attacks failed due to the cult's lack of technological understanding of anthrax as a BW agent. If Aun Shinrikyo had developed and disseminated an anthrax spore similar to the one released at the Sverdlovsk accident, there could have been many thousands of deaths. In other words, Tokyo escaped a BW catastrophe.

## The Benefits of Employing Most Biological Agents

Biological weapons offer an opportunity for the less powerful nation to level the playing field against the world's military superpower or for a terrorist group to incite a public reaction of enormous magnitude. How can this be? Five key attributes underlie the attractiveness of all biological weapons.

First, biological weapons are inexpensive to produce compared to other weapons of mass destruction.[58] These weapons are often referred to as the "poor man's nuke." With only a few hundred dollars to purchase fermentation equipment for "home brewing," many people could grow large amounts of viable bacteria in a few days. With a few thousand dollars, one would have sufficient funds to acquire, produce, and deploy bacterial agents that could kill thousands of people. It has been calculated that to get the same lethal effect from a nuclear weapon, you would have to invest eight hundred dollars for every dollar invested in a BW program.[59]

Second, dual-use equipment gives a BW perpetrator the ability to produce either legal vaccines/pharmaceuticals or BW agents.[60] Since the same equipment is required for legal uses, the perpetrator can easily deny that the equipment was used for production of biological weapons.[61] This also helps to lower the overall cost of the biological-weapon production if the facility also can be involved in a legal activity that produces consumer products. Dual-use capability also means a staff of trained personnel is always available for production.

Third, bullets are fast, bombs are loud, and their effects often dramatically evident, but BW silently inflicts its damage. The victim would likely be unaware an attack was taking place. Imagine being able to deliver a tasteless, odorless, and colorless weapon that could kill your enemy.[62] These attributes allow an adversary to disseminate these infectious agents without being noticed. The victim might have to take only one good breath of this invisible cloud, and his fate would be sealed.[63] This leads to the fourth attribute, plausible deniability. A state or a terrorist group can deny that it delivered a BW attack. Short of DNA sequencing of the agent used in the attack and matching it with an agent in the perpetrator's possession, proof of the attack may be speculative at best and, even

then, sequencing may not provide conclusive evidence of culpability.

Finally, most military weapons act immediately to get the desired effect, but the delayed effect (incubation period) from BW could work to an enemy's advantage. Various BW agents have incubation periods that range from one to 60 days. Imagine an adversary who knew he could not mass troops on a border because satellites would pick up his movements and US forces might respond to the threat. In the case of anthrax, the adversary could wait until 72 hours later when most people were either dead or starting to show symptoms. The US forces would be in a "survival mode" trying to save every soldier, which could impede the US ability to respond with an appropriate military response.

## Specific Benefits of Using Anthrax as a BW Agent

Although most of the attributes of *Bacillus anthracis* discussed below are not unique to anthrax, it is the only biological agent that has *every* attribute. While some attributes, such as lethality, are seen as positive for *Bacillus anthracis*, it may actually be negative to a perpetrator that prefers a nonlethal agent. Nevertheless, the following is a list of the agent's attributes that contribute to DOD's decision to designate anthrax as the number-one biological threat to the military.

- *Highly lethal* - Virtually 100 percent of exposed personnel will die from one breath of air with a lethal concentration of anthrax spores.[64] A lethal concentration has been estimated to be eight thousand spores to 50,000 spores.[65]
- *Noncontagious*[66] - This allows a military to use it against another military without concern of secondary spread from person to person. It also allows anthrax to be targeted at specific populations. Both of these features are particularly attractive to certain tactical, operational, or strategic applications. Smallpox and pneumonic plague (*Yersinia pestis*) are often high on the list of BW agents, yet these are both communicable and thus much more difficult for operational or tactical applications and also more dangerous to work with.
- *Easy to protect with advance preparation*[67] - An enemy could vaccinate his troops prior to an attack and know they were protected. Likewise antibiotics can be given in advance to mitigate the effects. This would add an enormous advantage physically and psychologically for invading forces to know that they were protected when entering a contaminated zone.
- *Stores well for long periods* - Anthrax spores can remain viable for years.[68] Climate control is not as critical as with other microbes because the spores have been known to live for decades in arduous environments. Anthrax was tested in the 1940s on Gruinard Island off the coast of Scotland, and viable spores could still be found until it was decontaminated in 1986.[69]
- *Stable in multiple weapon systems* - Many biological agents cannot withstand the turbulence experienced from being sprayed or detonated over a target. Yet the hardiness of anthrax allows enough of it to survive to retain its lethality. This versatility lowers the complexity for a BW perpetrator because one agent can be used in a missile warhead, artillery or mortar shell, or can be disseminated by a sprayer.
- *UV resistant*[70] - Sunlight (ultraviolet rays) will cause all potential BW agents to degrade. BW agents like tularemia die rapidly when exposed to sunlight. Only two agents, *Bacillus anthracis* and *Coxiella burnetii*, are considered resistant to degradation from sunlight.
- *Short incubation period* - If a weapon were to be used against military forces, being able to predict its time of effect is im-

portant. Since the incubation period (lag time between the attack and the first symptoms) of anthrax is one to six days, prediction of the timing of the effect would be much easier than for an agent such as brucellosis that has an incubation period ranging from five to sixty days.

- *Easily available* - Since anthrax is an animal disease that occurs around the world, soil samples from many different locations make anthrax readily available at numerous locations around the globe. Additionally, there are approximately fifteen hundred microbiologic repositories internationally that sell cultures worldwide to laboratories, vaccine companies, and other entities presumably for diagnostic and treatment purposes. These distribution centers serve as a potential source for anthrax procurement.[71]

- *Easy to produce* - Unlike viral agents that require more complicated production equipment, *Bacillus anthracis* can be produced in equipment common to almost any biologic production. It is easier to produce than almost any other BW agent.[72]

- *Naturally occurs at one to five microns*[73] - This is the optimal size for a BW agent because it is the right particle size to be breathed in and to get to the bottom sacs (alveoli) in the lungs. One of the more difficult aspects of developing a BW agent is to get it small enough so that it can get into the alveoli but large enough to stick to the wall of the alveoli and not be blown back out the airways. *Bacillus anthracis* is no exception. Although the spores naturally occur at the proper size, special milling is required to keep the spores from clumping into larger particles.

- *Can be used as a powder or liquid* - This flexibility allows anthrax to be used in various delivery systems, thereby enhancing a perpetrator's options.[74]

- *Requires a small amount for a mass effect* - The Office of Technology Assessment for the US Congress estimated that 64 pounds of anthrax delivered from an aircraft as an aerosol line in an area like Washington, D.C., would result in up to three million casualties with ideal weather conditions.[75] Another assessment by Oak Ridge National Laboratories showed that to produce the same lethal effect on a square-mile area, a perpetrator would need 1,763 pounds of nerve gas (sarin), 0.2 pounds of botulinum toxin (Type A), or only 0.02 pounds of anthrax spores.[76]

## Who Has an Anthrax BW Offensive Program?

The open literature is filled with charts and reports indicating who has BW programs and who has suspected programs.[77] It is very difficult to judge how extensive the BW threat might be since such capability could well be within range of most countries and biotech/pharmaceutical corporations and groups. Intuitively, one would think that any country that has an offensive BW program would probably have anthrax as a key component of its program. Consider the former Soviet Union, the United States, the Aun Shinrikyo, Iraq, and others.[78] Anthrax was one of the agents at the top of their list for production and weaponization. Many countries currently have weaponized anthrax, and many others are trying to acquire it.[79] Table 1, compiled by renowned biological terrorism expert Dr. Seth Carus, provides an idea of reported BW programs from different sources.

Any country listed on the table that has even a suspected BW program has probably thought about anthrax as a biological weapon. DOD recently responded in an unclassified document that "more than seven countries including Iraq, Iran, Syria, and Russia have or are suspected of developing this biological warfare capability."[81] Israel, Taiwan, and Libya are also suspected of having the in-

**Table 1**

**BW Programs by Country and Sources of Information**

| Country | ACDA* 1995–97 | DOD* 1996–98 | FIS* 1993 | DOD 1988–90 | Open Sources Pre-1993 |
|---|---|---|---|---|---|
| Bulgaria | | | | | X |
| China | X | X | | X | X |
| Cuba | | X | | | X |
| Egypt | X | | X | | X |
| India | | | X | | |
| Iran | X | X | X | X | X |
| Iraq | X | X | X | X | X |
| Israel | | | X | | X |
| Laos | | | | | X |
| Libya | X | X | X | X | X |
| North Korea | | X | X | X | X |
| Russia/Soviet Union | X | X | | X | X |
| South Africa | | | | | X |
| Syria | X | X | | X | X |
| Taiwan | X | | | X | X |
| Vietnam | | | | | X |

*ACDA = Arms Control and Disarmament Agency
DOD = Department of Defense
FIS = Foreign Intelligence Service of the Russian Federation

*Source:* W. Seth Carus, "Biological Warfare Threats in Perspective," *Critical Issues in Microbiology* 24, no. 3 (1998): 154.

frastructure prepared to grow and weaponize anthrax.

Secretary of the Air Force F. Whitten Peters told the Senate Armed Services Committee on 21 July 1999 that "[anthrax] has been weaponized and we know it is deployed in about 10 countries around the world."[82] Others have stated that there are at least 17 nations with BW programs. Three countries—the USSR, Iraq, and South Africa—had BW programs of which anthrax was an important part during the last 20 years. Their large, covert BW programs sent a strong signal to the international community.[83] The message is that a state can have an active BW program, sometimes of gargantuan size, which can be relatively hidden from the intelligence community.

Ken Alibek reports that the USSR's intricate BW enterprise produced tons of BW agents including anthrax, plague, tularemia, smallpox, and the Marburg virus. During the 1980s, some of the Soviet Union's intercontinental ballistic missiles (ICBM) reportedly were loaded with "cocktails" of these agents and targeted at major US cities such as New York, Chicago, Los Angeles, and Washington, D.C. Alibek states that one ICBM could carry enough anthrax to wipe out the population of New York City. Many of his revelations about the magnitude of the Soviet BW program have

been corroborated by other credible sources such as Jonathan B. Tucker, director of the Chemical and Biological Weapons Nonproliferation Project at the Center for Non-Proliferation Studies in Monterey, California.[84]

Likewise, Saddam Hussein's BW program seemed to slip by the awareness of US intelligence.[85] Everyone was aware that Iraq had CW because of its documented use of nerve/mustard agents in the Iran-Iraq War and Iraq's use of cyanide/nerve agents on its own citizens, the Kurds. The United States and others also suspected that Iraq had a BW program, which was confirmed in 1991/92 by the UN Special Commission (UNSCOM) inspections. It wasn't until the 1995 defection of Lt Gen Hussein Kamal, Saddam's son-in-law and the former head of the Iraqi BW program, that the real magnitude of its program came to light. The information he shared with Rolf Ekéus, executive chairman of UNSCOM, revealed that the Iraqis had a much larger program than UNSCOM realized and that it was organized around anthrax and botulinum toxin. Iraq indeed had large stores of weaponizable anthrax and many weapons loaded with anthrax (bombs, Scuds, Al Hussayn warheads, 122 mm rockets, artillery shells, spray tanks for fighters and remotely piloted aircraft).[86] Iraq had been able to hide much of its BW program in spite of the intrusive UNSCOM inspections.[87]

South Africa's previous BW program still seems to be a bit obscure. Investigation into alleged atrocities was initiated in the early 1990s. There are claims that Rhodesian troops were provided anthrax in the late 1970s to be used against guerilla rebels trying to overthrow the white minority rule.[88] Dr. Wouter Basson, a former special forces army general and physician to former president P. W. Botha, headed the South Africa BW program. Basson is still working for South Africa in its military's medical section.[89]

## Is Vaccination the Right Decision?

Again, an aerosol exposure to anthrax spores causes respiratory anthrax, which is rapidly fatal in nearly 100 percent of cases if untreated. Given the rarity of the disease and its quick progression, a diagnosis of inhalational anthrax is difficult to make. Treatment consists of massive doses of antibiotics and supportive care. However, there are no human studies available on postexposure treatment. Limited studies in monkeys have shown that postexposure treatment with antibiotic (ciprofloxacin or doxycycline) plus administration of vaccine is effective in preventing death.[90] Given the potential for an unrecognized weapon release, it makes sense to provide protection to our military personnel with an effective vaccine before exposure.

The US vaccine known as Anthrax Vaccine Adsorbed (AVA) is an inactivated cell-free product and has been licensed by the Food and Drug Administration since 1970. The bacteria's toxin components are the primary factors in disease. Since the toxin plays such a critical role in the pathogenesis of anthrax, it was a logical step to develop a vaccine based on toxin components. The protective antigen (PA), a constituent of lethal and edema toxin, is the primary component of the currently licensed anthrax vaccine. The filtrate of the cultures of an attenuated strain is adsorbed to aluminum hydroxide to increase antibody responses, and preservatives are added for stability. The Michigan Department of Public Health (MDPH) held the license and produced modest quantities of vaccine as needed between 1970 and 1990. Primary customers included at-risk veterinarians, wool-mill workers, and laboratory workers who handled anthrax cultures or potentially contaminated materials.

At the time of Operation Desert Shield/Desert Storm, the MDPH had a limited production capacity. Due to DOD's critical need for large quantities of vaccine, the MDPH immediately began to produce as much vaccine as possible in the existing facility. Since specialized equipment (such as 100-liter fermenter tanks) was essential, DOD authorized purchase of additional tanks to set up three identical production lines. The MDPH produced all the AVA that was used for US forces

in Desert Shield/Desert Storm. A total of approximately 150,000 individuals received one or more doses of anthrax vaccine, approximately 250,000 doses in all.

The vaccine is licensed to be given in a six-dose series, with the first three doses given at two-week intervals. Doses four, five, and six are given at five- or six-month intervals. The perfectly administered series is referred to as zero, two, and four weeks, six, 12, and 18 months. Thereafter, annual booster doses are required to maintain immunity. The vaccine was licensed on the basis of a study conducted in wool-mill workers showing that AVA was effective in reducing the number of cases—the cutaneous and inhalational forms jointly—of anthrax infection.[91]

Since it is unethical to expose humans to biological-warfare agents, most of the information available on the efficacy of the vaccine against inhalational anthrax is derived from animal data. Studies have been conducted in mice, guinea pigs, rabbits, and nonhuman primates using the aerosol route of exposure.[92] Rabbits and rhesus monkeys have been found to be the animal model most like humans in terms of disease pathology and antibody response. In one series of experiments using experimental monkeys, inoculation with two doses of this vaccine completely protected all the animals against an aerosol challenge given at eight or 38 weeks after vaccination.[93] In all, 62 of 65 vaccinated monkeys and 114 of 117 vaccinated rabbits survived lethal challenge, whereas all unvaccinated control animals died.[94]

When the state of Michigan decided to divest its vaccine production capability, Bioport Corporation bought the MDPH facilities in September 1998. Bioport has renovated the facilities and has submitted a Biological License Application supplement to meet standards set by the FDA. At the time of this writing, there is no approved current new production of vaccine, and DOD is using vaccine from the existing stockpile. All doses administered to US forces have passed potency tests and tests for sterility, purity, and safety.

In two different studies, the incidence of significant local and systemic reactions to the vaccine in the placebo-controlled field trial was 2.4 to 2.8 percent and 0.2 to 1.3 percent.[95] Local reactions consist of induration, erythema, edema, warmth, and tenderness at the injection site. These reactions peak at one to two days and usually disappear within several days. Systemic reactions may include myalgia, headache, and moderate malaise that may last for a few days. These types of reactions have been seen with many other routinely administered vaccines and present no cause for concern.

The secretary of defense announced in December 1997 a plan to immunize all active and reserve military personnel with the AVA. The secretary stipulated that immunizations would not begin until DOD (1) established a means of testing the vaccine over and above tests required by the FDA, (2) developed a system for tracking vaccinations, (3) approved operational and communication plans for the vaccination program, and (4) had an outside expert review the health and medical aspects of the program. In May 1998, the secretary announced that all these conditions had been met, and in August 1998, DOD began the Anthrax Vaccine Immunization Program. To date, over 1.8 million doses of vaccine have been administered to more than 488,000 people.

## Conclusion

The anthrax threat to the US armed forces is real. Evidence continues to mount that more states and nongovernmental organizations unfriendly to the United States either have or are building BW programs. The lethality, hardiness, and ease of production of the anthrax bacteria have made it a mainstay of known BW programs. These same qualities make producing and weaponizing anthrax a top priority for many developing countries and nonstate actors trying to boost their influence on the global stage. The chance of US forces encountering anthrax is greatly enhanced by multiple deployments to high-risk

regions of the world. These factors, combined with a near 100 percent postinfection mortality rate, make it strategically and morally necessary for DOD to do whatever it can to defend its forces against this potentially devastating weapon.

The only defense against an anthrax attack, other than destroying the weapons before an attack and making use of personal protection during an attack, is to vaccinate service members. The vaccine currently being administered to the US armed forces has been used safely for 30 years and has passed extensive testing by the FDA. As with most commonly used vaccines, uncomfortable reactions to anthrax vaccinations do occur in a small percentage of cases. These reactions present little cause for concern and pale compared to the effectiveness of the vaccine against a virtually untreatable and fatal disease. The data is convincing and clear that the protection provided by the anthrax vaccine makes it the appropriate choice for protection of US forces against this biological-warfare agent. □

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# Expeditionary Leaders, CINCs, and Chairmen

## Shaping Air Force Officers for Leadership Roles in the Twenty-First Century

DR. JAMES M. SMITH

*Editorial Abstract: In this article,* APJ *is honored to play a part in announcing to the Air Force the Developing Aerospace Leaders project. The twenty-first-century international environment suggests that our aerospace leaders may need to be more skilled in strategic thinking than their predecessors. How should the Air Force change the currently stovepiped career-and-assignment structure to develop strategy-savvy officers with experience broad enough to lead in an uncertain future? Rising to the challenge of producing such strategist-leaders, the Air Force chief of staff initiated the Developing Aerospace Leaders project in October 1999. Dr. Smith, a member of that team, outlines some of the challenges and proposes one possible solution requiring a substantially changed system of professional military education with specially selected "strategist grooming" assignments for its graduates.*

ONE OF THE clearest imperatives of the emerging century for the United States Air Force is to prepare its senior officers for enhanced leadership roles in a rapidly changing and challenging national-security-policy environment. A truly expeditionary force will require greater skills in regional languages, cultures, and political-military dynamics. But more importantly, the global aerospace force—a primary instrument of choice for protecting and attaining national interests—will require organizational leadership, strategic knowledge, and perspective to ensure the full consideration of the unique contribution of aerospace power to enhance the nation's security. As Gen Michael E. Ryan, the Air Force chief of staff, recently put it, the Air Force has an institutional responsibility to "ensure complete understanding of national security interests and . . . fully exploit the aerospace domain to support national objectives."[1] This is what is behind the chief's Developing Aerospace Leaders initiative. The Air Force must prepare its leaders with the global skills to command and lead expeditionary operations successfully. It must also build and foster operationally savvy leaders who have the enhanced strategic vision and expertise to serve as commanders in chief (CINC) and chairmen, as well as key senior advisors to CINCs and chairmen. Those strategic leaders will not emerge by accident. They must be prepared, shaped, mentored, and fostered across an entire career of growth and experience. This requires specific development beyond that which exists today.

This article briefly outlines the why, what, and how of preparing the Air Force officer corps for leadership roles within the emerging US national-security environment. It begins with the *why*, summarizing both the international and domestic political-military changes that are presenting a new and expanded set of complex challenges to our strategic leaders. It then addresses the *what*, the broad set of strategic competencies required for aerospace leadership within the changing environment. Finally, it suggests the outline of *how*, a holistic approach toward shaping strategic leaders across a career of service for ultimate participation in senior national-security roles.

## Changed and Changing Context

### *International Security Environment*

Turned upside down by recent events, the international environment of US national security continues to seek a new equilibrium across the next few decades at least. The coincidental impacts of the end of the cold war and the conduct of the Gulf War upended the established global political and security dynamic while simultaneously bringing the full weight of the ongoing "revolution in military affairs/revolution in military technologies" to bear within the operational dimension. This immediately created new conflict structures and new response mechanisms, all with vastly expanded expectations of the efficacy of force on a widening array of not-necessarily-military problems. The "opportunities" to succeed or fail and the almost unquestioned expectations of "success" all increased, while the realities of the complex calculus of the "threat" became ever deeper and murkier.[2]

The future international-security environment is still largely a hazy picture. It promises a whole new world superimposed upon the skeleton of a lingering past. Threats could emanate from emerging peers, certainly from failed and rogue states, and as asymmetries from states and nonstates as well—and this in the face of the widening availability of even the most dangerous weapons and delivery systems. Just as the threats remain hazy, there appear only threads of a response strategy—one with changed concepts of deterrence, compellence, and denial, for instance. Without a clear strategy with which to face an uncertain range of threats, one cannot decide upon a firm structure. What we can do today is prepare and employ general capabilities in a range of functional areas, old and new, all against significant resource limitations. Just as

the threat and response are uncertain, so is a clear concept of a decision structure to address them—this in an era when the experience base in the whole range of security is shrinking, both within the government and the public.

Currently—and, more importantly, into the foreseeable future—this security uncertainty imposes a wide and formidable set of requirements and expectations on the Air Force. As the military service with the widest range of mission tasking across the entire spectrum of "cooperative" surface-force support and "independent" national-objectives-support operations, the Air Force finds itself tasked with conducting surgical and sterile operations as well as missions ranging from humanitarian assistance to nuclear deterrence, from peace support to countering weapons of mass destruction, and from military operations other than war to space-based and cyber-based operations. In a reactive political environment, aerospace assets offer rapid and proven response options, often in situations in which past success is only marginally related to the current challenge. Our leaders must be both broadly and deeply prepared across the operational, technological, political, and organizational dimensions to adapt and truly lead an adaptive force on an uncharted path. The international future, then, offers up a whole slate of questions and requirements, and sets a steep agenda for preparing strategic leaders.

### *Domestic Political Environment*

Like international security, the domestic environment has also undergone profound change. The Goldwater-Nichols Department of Defense Reorganization Act of 1986 altered the decision structure for security policy, creating new roles for and expectations of military participants in the interagency security-policy process. The end of the cold war then shifted the focus and priorities of the political players in that process quickly and clearly away from traditional security concerns toward domestic, social, and economic arenas of policy. Consequently, today's military strategic leader must be prepared for deeper involvement in policy, at a higher level and within an environment where knowledge of and experience with the military dimension of policy are rapidly diminishing. The stakes and expectations here are greater, and they continue to grow.

The traditional American adage that "politics stops at the water's edge" was representative of the expectation of bipartisan (and largely unquestioned) support for presidential prerogatives in the foreign- and security-policy arenas. In fact, scholars referred to the "two presidencies" to indicate the vast differences in congressional support for presidents on foreign and defense issues, as opposed to domestic legislation.[3] Later analysis indicated clear differences in executive/legislative relations on three sets of issues, with clear presidential prerogative in crisis situations, executive lead and general congressional following (but not without some questioning) on issues of strategy, and full congressional debate—even frequent divergence—on weapons system and other "structural" questions.[4] In the post-cold-war era, these distinctions have all but disappeared. Presidential decisions to employ military force in "crises" were actively questioned, with congressional authorization ultimately demanded and only narrowly granted, for both the Gulf War and Kosovo operations. Security politics today are characterized as fully engaged, partisan, and interbranch issues of debate and conflict.[5] As one observer reacted to the Senate's failure to ratify the Comprehensive Test Ban Treaty in October 1999, "This time politics washed over the entire continental shelf."[6]

### *Aerospace Leadership in Today's National-Security Environments*

The continuing changes in both the international and domestic dimensions of US national security combine to create ever-increasing demands for additional, more capable, and more expert strategists within the uniformed military. As the technologies and capabilities of aerospace power offer perhaps the greatest flexibility and comparative advantage for dealing with

emerging threats, it becomes most incumbent on the Air Force to provide competent leaders to represent both the realistic capabilities and limitations of aerospace power within the decision structure.

Thus, the *why* of specifically developing Air Force strategists is clear. The dynamic complexities of the international environment demand specialized knowledge and attention. At the same time, the domestic policy-making process and its evolved roles for uniformed military officers require active and expert involvement. Both the decreasing knowledge of and attention to national security and, particularly, military issues, instruments, and factors mandate a deeper, active policy involvement to educate and even advocate in the national-security interest. Finally, although this *why* applies to each of the uniformed services, it is particularly incumbent upon the Air Force—the service that offers, debatably, the widest range of usable and useful military options in a constrained operational environment—to build an officer corps steeped in strategic perspective and incorporating a cadre of expert senior strategists to best advance the national interest. As General Ryan put it, the requirement "is to develop officers who understand the full spectrum of Aerospace Expeditionary Forces and aerospace operations, leaders who can be articulate in staff assignments, in joint assignments, in operational assignments—regardless of their core specialty."[7]

## Strategist Competencies and Aerospace Leaders

The clarity and power of the *why* behind developing aerospace officers who are strategically minded also provide us a road map to the *what*—the specific characteristics and competencies that this officer corps must develop to fulfill its mandated and desired roles. Recent studies of officer requirements within the changed environments indicate a premium on three linked sets of attributes of senior military leaders: enlightened leadership; broad and deep operational expertise; and strategic, political-military perspective and ability.[8] These competencies are developed here in two broad groups. First are the competencies more aligned with Air Force leadership and operations—those of most direct application in expeditionary and global aerospace operations. Second are the competencies more aligned with policy, strategy, and plans—those of most direct application to aerospace component commanders in their staff advisory role, to CINCs and their staffs, to the Air Force chief of staff in his Joint Chiefs of Staff (JCS) role, and to the chairman and his JCS advisors. Every aerospace officer needs an increased level of exposure, experience, and even expertise in both groups of competencies, with the depth and breadth of expertise—particularly in the second group of competencies—increasing with rank and preparation for command and/or staff policy and strategy involvement. In all cases, this is a broader set of competencies than we deliberately develop today. Specifically in the strategy and organizational arenas, as well as in the evolving national-security environment, these competencies must also be developed much more deeply.

### *Leadership, Technology, and Operations Competencies*

In addition to the deep and broad functional expertise required of leaders within today's operational environment, senior aerospace command requires further broadening and deepening of selected dimensions in order to most fully succeed within the changed national-security environment.

**Leadership.** Aerospace leaders today must attain the capacity to think and exercise judgement based on strategic perspective. This involves critical and flexible thinking, creativity, synthesis, and integration skills. It also requires effective communications and advocacy skills. The aerospace leader must be adept at peer leadership and matrix management and be able to build and sustain effective teams, including nontraditional ones such as joint, coalition, and interagency teams. Further, all leadership can be truly effective only when it is based on the most ex-

emplary qualities of character, as the nation demands.

**Technology.** In today's military environment—particularly the aerospace realm—technical knowledge and the ability to effectively orchestrate complex and diverse technical components are essential. Leaders must be able to adopt an engineering, technical thought process to frame and resolve the ill-defined problems that confront senior commanders daily. They must also be skilled at applying a systems perspective to ensure the effective integration of the wide range of diverse technologies represented in joint and coalition operations. Finally, they must be versed in air, space, and cyber systems and in their independent and synergistic applications.

**Operations.** The aerospace leader must approach command with a full capability to apply the Air Force's core competencies and the joint, overarching, operational concepts that they reinforce. That leader must also be fully prepared to exercise effective command through expeditionary operations, with an ingrained appreciation for global and regional security, as well as political, geographic, cultural, and language factors that affect aerospace operations. Aerospace operators must also be expert at applying aerospace power within the joint and coalition planning processes, and in exercising effective command and control of aerospace operations through the combined air operations center structure. Within the application of aerospace power, the leader must fully optimize and orchestrate space and information capabilities as key enablers—even primary systems—and must also be fully capable of incorporating specialized aerospace missions and systems such as special operations and combat search and rescue. Because of the breadth of the set of nationally tasked aerospace missions, the aerospace operator must also be knowledgeable of nuclear-deterrence systems and nuclear operations. Finally, the aerospace operator must be fully prepared to direct and conduct aerospace operations in defense of the homeland or in force projections, both from bases in the continental United States and from forward-deployed locations.

### *Strategy and Organizational Competencies*

Beyond those essential competencies, senior aerospace leaders in the twenty-first century will require a more specific set of competencies in the strategy and multifaceted organizational arenas that constitute today's context of national security and aerospace-power applications.

**Strategy.** It is absolutely incumbent upon aerospace leaders to be well grounded in the complex character of both the global and regional national-security environments in which they operate. This grounding must go beyond the traditional focus on political, historical, geostrategic, and even cultural factors to address such issues as economic security and interdependence, and environmental security as background to stability or conflict. It is also imperative to be fully versed in the complexities of regional ethnic conflict, issues of failed and failing states, and other broad regional-security challenges. Transnational threats such as terrorism, drugs, and crime must be factored in as they affect both regional and global security. The full cast of players in the emerging security environment must be incorporated into senior leaders' understanding. These include states, international organizations, and other suprastate influences, as well as nongovernmental organizations, multinational corporations, and other nonstate actors and their many roles in international relations, today and tomorrow. Finally, all of this complexity must be addressed within the context of globalized information and the rapid proliferation of technology. The world indeed has changed, it is still changing, and it presents a new arena that aerospace leaders must be fully prepared to enter.

Within that changing environment, the senior aerospace leader must also understand the changing role, efficacy, and use of military power, particularly in conjunction with nonmilitary instruments. Today's environment has already presented us with nontradi-

tional applications of aerospace power across a widening spectrum of military operations. Although the essence of war remains largely consistent, the aerospace leader particularly must be able to trace both the factors of continuity and the impetus of change in how military forces and force are employed today. This leader must also be expert in understanding and applying coalition aerospace power within the constraints of both the American and coalition systems of command and support. Significantly, the aerospace leader, as much as any other military commander, must understand and be prepared to articulate both the promise and the limits of modern military power in a wide range of international scenarios.

One essential knowledge set for this commander is a solid grounding in national-security strategy—its legacy and evolution, the set of interests and objectives that are its cornerstone, the threats it addresses, the way it sees the integration of the various instruments of power that seek those interests in the face of defined threats, and the way the military—particularly aerospace power—fits into the strategy it communicates. This leader must be equally well versed in the national military strategy, not only the specific tenets but also the political-military context—from the place and role of the military in the US Constitution, government, and society to the utilization of that concept across all levels of force application. This takes on ever-greater importance as we see a continuing blurring of the divisions among the traditional political, military, and economic dimensions of policy and strategy. This integration of instruments will only continue, even accelerate, in the face of revolutionary advances in information, science, and technology.

**Organization.** The aerospace leader must also be fully competent in understanding and playing constructive roles in the processes of formulating and implementing security strategy and military strategy. That leader must understand our national, Department of Defense (DOD), Air Force, alliance, and coalition-partner decision structures and processes. Within the US government—certainly for both the executive and legislative branches—this includes firm knowledge of other government-agency planning systems, the complex dynamics of the interagency-policy process, and the roles played by extragovernmental players, including interest groups, corporations, public opinion, and the news media. Further, a broad understanding of joint and alliance planning and execution systems is required, as is a detailed appreciation for coalition-partner civil-military relations and processes. The foundational formulation of combined operational effects is as important as the orchestration of those effects in practical execution, from shaping activities to combat.

#### *Aerospace Perspective*

Finally, in all of those myriad activities and responsibilities that the aerospace leader must prepare to competently undertake, the underlying construct must be the full understanding and articulation of military command from the unique perspective of aerospace power. This leader must be able to articulate the promise and the reality of what aerospace can contribute to national power, even to advocate that position when aerospace offers the most effective and/or efficient means of attaining national objectives. Such an aerospace perspective can be fully understood and articulated only by an aerospace leader—historically, the perspective has been overlooked or undervalued by those coming to the table from other environments, as recognized in 1943 in Field Manual 100-20, which asserted that only an airman could effectively command air forces.[9] The extent of the added uniqueness of air and space, of aerospace, magnifies this imperative today and in the process makes it ever more incumbent on the aerospace leader to ensure that the aerospace perspective is on the table.

## Developing Aerospace Strategists

Against the *why* and the *what* of developing aerospace officers with strategic expertise and

perspective, we now consider *how* to make that happen through a careerwide program of strategist development. That development must begin from the very outset of the aerospace officer's military career and continue with the core of the development effort found in education.

In an insightful article in the journal *The Public Interest*, Theodore J. Crackel wrote that "American military education has at its heart two crucial processes—the making of lieutenants and the making of colonels. How we prepare young men to lead others into battle, and how we ensure that those who assume the highest commands are well-qualified, are issues that must be addressed with utmost seriousness, because failure here can have the gravest consequences."[10] Crackel made this point for the cold-war-era military and couched its focus in terms of preparation for operational command. But the article's broadened essence rings true today: educating junior officers to assume their central roles in national-security-policy implementation and educating senior leaders for their national-security-policy formulation and oversight roles are the "bookends" of the cross-career development of commanders, chiefs, CINCs, and chairmen.

From his perspective as CINC, Gen John R. Galvin, USA, Retired, both underscored and expanded on Crackel's theme in calling for the creation of "strategists" within the US military:

> We need strategists . . . throughout the services. At all levels. We need senior generals and admirals who can provide solid military advice to our political leadership, and we need young officers who can provide solid military advice—options, details, the results of analysis—to the generals and admirals. We need military strategists, officers, all up and down the line, because it takes a junior strategist to implement what the senior strategist wants done, and it (usually) takes the input of juniors to help a senior strategist arrive at his conclusions.[11]

"Making lieutenants" includes establishing a solid foundation of knowledge and skills in national security upon which the officer can build across a career. "Making colonels" involves synthesizing their accumulated experiences and preparing them to take the next step up to active roles within the national-security-policy process. As stated, these two focal points provide roughly the bookends of a career-long process of broadening and deepening the officer's strategic perspective and skill set.

The focus here on education is not misplaced; after all, it provides the essential foundation in the development of strategic and organizational competence. A base level of knowledge, a firm grounding in the processes and organizational dynamics of strategy, and—most importantly—the development of a strategic context and perspective against which to analyze subsequent observations gained from direct exposure are all requisite educational outcomes. Education provides the framework against and upon which all experience will be made meaningful and competency enhanced. Although education is the essential first piece in the development effort, subsequent experience maximizes the educational benefits. Selective outplacement from educational programs—certainly, the identification of "strategist" assignment opportunities—is necessary to provide full mastery of "the strategist art." Finally, the Air Force, in identifying such positions and in certifying strategist competency, must regard faculty duty as valuable experience. As education is the essential base of competency here, teaching strategy deepens officer skills more significantly than in almost any other set of aerospace skills.

Table 1 outlines the education continuum of aerospace leaders and strategists across an entire career. Two columns display each formal and informal educational program. The "Aerospace Leader" column addresses the programs as they should ensure an enhanced strategic competence for all aerospace leaders entering an expeditionary era. Every officer participating in these programs will broaden required strategist competency through that participation. The "Strategist Specialist" column outlines the contributions those same programs should make to create a

**Table 1**

**Educational Development of Aerospace Strategists**

| *Educational Program* | *Aerospace Leader* | *Strategist Specialist* |
|---|---|---|
| Capstone | Capstone | Capstone |
| Air War College (AWC) Resident | AWC Enhanced Core | AWC Electives + Research |
| AWC Nonresident | AWC Nonresident Program | AWC Enrichment + Research |
| Fellows Program | Strategist Focus | Strategist Immersion |
| School of Advanced Airpower Studies (SAAS) | Strategist Fusion within Core | SAAS Core + Research |
| Air Command and Staff College (ACSC) Resident | ACSC Enhanced Core | ACSC Electives + Research |
| ACSC Nonresident | ACSC Nonresident Program | ACSC Enrichment |
| Graduate Education | Leader Enrichment | Strategist Major |
| Air Force Intern | Strategist Overview | Strategist Immersion |
| Guided Research | Leader Enrichment | Strategic Research |
| Mentoring/Self-Study | Universal Materials | Strategist Materials |
| Squadron Officer School (SOS) | SOS + On-Line | Foundation |
| Aerospace Basic Course (ABC) | ABC + On-Line | Foundation |
| Officer Training School (OTS) | OTS + On-Line | College Major/Electives |
| Reserve Officer Training Corps (ROTC) | ROTC + Suggested Electives | College Major/Electives |
| US Air Force Academy (USAFA) | Core | Core/Major |

cadre of strategist specialists within the field-grade ranks and prepare them for direct roles as political-military staffers in advisory positions to our most senior service and joint leaders, as well as for uniformed service outside DOD. This strategist-specialist track would expand on and invigorate existing political-military specialty programs and would focus outside of intelligence and into operations and planning/programming. The Air Force should review existing billets requiring political-military expertise and tailor a single strategist-development program to produce a pool of qualified specialists. Finally and ideally, those aerospace operators most fully prepared to become competitive for selection as J-5s and senior Joint Staff leaders, CINCs, or chairmen would take one or more selective excursions into the right column for further broadening and strategic deepening while tracking up the "Aerospace Leader" column as an integral part of their operational career.

Currently, a senior Air Force officer completing the full complement of Air Force professional military education (PME) courses in residence (plus the Armed Forces Staff College) will spend approximately 33 months, or just under 8 percent, of a 35-year career in PME. Those officers adding either the Air Force Intern Program or SAAS will log approximately 45 months in school, or almost 11 percent of the 35-year career. Finally, completing both the Intern Program and SAAS, or completing an in-residence graduate-degree program, will entail approximately 57 school months, or almost 14 percent of the 35 years. The suggested path of strategist-leader development here would fall within the range of the latter two categories above—11 to 14 percent. Details of those education programs at each level of career progression are presented below.

***Precommissioning and Primary Commissioned Education: The Foundation***

General Galvin reaffirmed the requirement to begin the preparation of strategists from the very beginning of an officer's military career: "We need to agree that strategy is not an 'elective' of the later years of an officer's career—that work in this field needs to begin early. The lieutenant does not have to be a strategist, but he must be aware that what he is absorbing will contribute to a knowledge of tactics and operational art constituting milestones on the way to ability in the field of strategy."[12]

Precommissioning and early commissioned educational programs must provide the solid foundation—both in terms of knowledge and perspective—upon which career experiences can be "absorbed" to deepen and broaden the junior officer's progression up the learning curve toward strategist. Each of the formal educational programs at this level has distinct and complementary roles to play.

**Precommissioning Education.** Among the three precommissioning education programs addressed here (USAFA, ROTC, and OTS), USAFA has the luxury of four years' dedicated time to prepare its graduates. This allows the Academy to provide a universal core curriculum of 109 semester hours, a common academic experience that provides a broad and selectively deep foundation across the full range of strategic competencies. USAFA also offers strategist-relevant academic majors and minors that provide a jump start, either further up the generalist-leader path or into the entry levels of the strategist-specialist track. ROTC and OTS are much more time-constrained than USAFA, but careful tailoring of their programs—along with selective borrowing of materials and copying of program elements from USAFA—provides significant strategist preparation. ROTC should provide its cadets—except those majoring or completing a minor degree in a strategist-relevant discipline—with a list of desired elective courses. Cadets could then seek to work some or all of these courses into their academic schedules. The Air Force could also work with ROTC-host universities to allow academic substitutions or other accommodations to allow cadets to better incorporate such courses into already-prescribed programs. Also, the ROTC curriculum should incorporate increased emphasis on strategist constructs into its existing lesson plans. Finally, given additional resources, the Air Force should require selected strategist-preparation courses regardless of academic major. For OTS, completion of this same list of suggested courses would be desired. As an alternative, and for the ROTC-sourced officer who cannot complete the suggested electives, the Air Force should provide a distance-learning strategist-reading program. Gaining a strategist-relevant degree, completion of the strategist electives, or successful accomplishment of this distance-learning program should be prerequisite to reporting for the Aerospace Basic Course.

**Primary Commissioned Education.** Although the prerequisite academic and self-study programs outlined above will provide a cognitive, foundational building block for strategist development, ABC should reinforce that knowledge through specific applications

where indicated across the entire curriculum. It should also build on that foundation to create the more affective strategic perspective required of all aerospace leaders. Case studies in applications of military—specifically aerospace—power and a host of experiential learning exercises should deliberately incorporate political-military issues and lessons to apply and reinforce the prerequisite programs. These applications must emphasize Air Force leadership practice to provide further broad foundation prior to technical (and narrower) specialization. The Air Force should provide a second-level strategist distance-learning reading list and education program to build on the ROTC/OTS/ABC prerequisite program, this one as prerequisite to SOS. The objective here should be to keep the young leader engaged in strategist thinking and development and also to reinforce the strategic perspective, even at a career point when the junior officer in the field is immersed in deepening his or her technical specialization. This program should emphasize more complex applications of aerospace power with a clear focus on issues and examples of integrating the political, economic, informational, and military instruments. The SOS programs, then, should incorporate both cognitive and affective emphasis on (1) aerospace-capability integration toward maximizing aerospace effects and (2) national-instrument integration (and aerospace power's place in that integration) toward the attainment of national military and security objectives. Again, the key here is reinforcing a strategic perspective in our developing leaders. Finally, ABC and SOS programs should be developed as a deliberate pair—SOS building directly on ABC—and both designed to complement precommissioning programs to complete a smooth and synergistic launch to the aerospace leader's/strategist's career.

Thus, the initial tier of leader and strategist development should include a foundation building block of knowledge and, at least as importantly, a strategic attitude and worldview upon which further development can be based. Continuing education and selective assignment, then, provide the follow-on steps up the learning curve to senior-strategist competencies.

#### *Professional Military and Civilian Graduate Education: Broadening and Deepening*

The road to producing strategists, it follows, must proceed through career-long development of strategic leadership, operational competence, and strategist preparation. Staged, continuing education provides the framework of knowledge and skills behind inspiring, employing, and conceptually integrating strategic constructs in each of these dimensions.[13]

**Air Force Intern Program.** Available only to a handful of officers each year, the Air Force Intern Program is a valuable launching pad for starting at least those few officers on the path to senior-strategist competency. Participating officers from operational specialties should be assigned to functions providing a broadening of national and servicewide perspectives on aerospace power, particularly strategic perspectives contributing to strategist development. Junior officers with deeper strategic backgrounds through education and/or experience should be provided immersion in selected staff functions toward deeper specialization in strategic arenas en route to midcareer assignments back to such functions. Although the second year of the intern program—with its opportunity to complete a graduate degree in conjunction with the internship—is currently unfunded, providing a civilian graduate education, particularly in strategic subject areas for selected officers, would pay the Air Force positive dividends.

**Civilian Graduate Education.** Such education in security studies and other strategist specialties provides a large step up the learning curve toward advanced strategic competency. These programs provide knowledge and experience while also exposing selected officers to broader strategic perspectives—civilian as well as military—and a wider range of strategist practitioners, many of whom may eventually fill civilian-strategist positions

within the interagency process.[14] Following civilian graduate education with assignment to a position that allows mentored application—whether staff duty or faculty positions—would provide a valuable internship for strategic specialists.

**Continuum of Professional Military Education.** The sequence of formal PME programs—in the Air Force, ranging from the lieutenant's ABC through the general officer's Capstone course—periodically provides specific study of the profession of arms. Increasingly, in the face of the complexities of the operating environment where the Air Force operates, PME must also allow reflection and focus on critical thinking and reinforce the value of a strategic perspective as the context within which that thinking must take place. As the military faces increased blurring of traditionally separate roles, PME must infuse a focus on the national military strategy as it seeks to integrate military power with diplomatic, economic, and informational instruments. It must address both the efficacy and limitations of military power within the complex international environment—particularly, unique aspects of military power such as aerospace power. Each level must reinforce its predecessor(s), broaden selectively, and deepen the officer's foundation across the continuum, as well as build educational experiences to reinforce and expand on both prior education and practical experience toward enhanced competence.

The *intermediate service school* (ISS) has become the primary vehicle for taking the expertise developed in tactical experience and transitioning to the operational level of war. For the Air Force, this also has made ACSC the center of education on applied operational airpower and air campaign planning. With increasing emphasis on the broader concepts of aerospace warfare, this operational focus must remain at the center of the ACSC/ISS experience. However, through focus on integrated learning outcomes rather than curriculum hours, ACSC should ensure that the political-military dimension is incorporated into all operational cases and lessons and that the political/environmental and organizational context of aerospace operations and the political constraints on campaign planning are clearly present in the curriculum. This dimension is currently not fully introduced until senior service school (SSS), and the gap between the operationally oriented ISS and the more strategic SSS is artificially wide. ISS graduates will find themselves in positions requiring a broader operational and strategic perspective, and ISS cannot simply stop with the operational aspects of modern aerospace operations. The strategic aspects of aerospace operations can also be reinforced through strategically focused elective courses and the mentored, sponsored research that is again an important part of the ACSC curriculum.

Within this suggested framework, the *School of Advanced Airpower Studies* stands as the "finishing school" to greatly deepen operational focus and campaign-planning expertise, but it also provides a bridge to a deeper strategic focus. Here again, along with more specific aerospace broadening, the curriculum should incorporate strong emphasis on the policy side of core campaign studies and cases, all toward a full examination of the true potential—and limitations—of aerospace power. Further, the research requirement could be tailored to incorporate the strategic aspects of the subject researched. SAAS should stand as a selective path toward enhanced airman-strategist competency en route to senior positions determining, directing, and applying national military strategy. The SAAS experience is unique and valuable, and the Air Force must select its best people, give them the best possible education, and assign them selectively throughout the remainder of their careers to ensure full return on this investment. Finally, SAAS must remain a small and selective school, but its materials and lesson plans should be made available to the force for more universal self-study and mentored development.

The focus at the *senior service school* level is correctly on the strategic level of warfare, just as the ISS focus is on operations. Even so,

some focus on strategic context should be moved down to ISS to narrow the gap between these two levels and establish the strategic context behind complex aerospace operations. For this same reason, focus on the policy process, the interagency process, and the integration of military—particularly aerospace—power into the broader national-security strategy must be highlighted in the AWC curriculum. I also advocate the requirement for a strategic research project in the AWC program. The students learn more in experiential activities such as applied research than they do in more static classroom experiences, and accomplishing research directly related to the strategic path they will follow after graduation can only enhance the AWC learning experience.

*Nonresident or distance-learning ISS/SSS programs* should play an expanded role, bringing as much of the resident PME experience as possible to officers in the field. This requires a continuing commitment of resources to ensure currency, relevance, and scaled rigor. The current AWC option that allows sponsored research should be continued and encouraged. These programs should be tailored to provide both a substitute PME experience for those who cannot attend in residence and a valuable professional resource for other Air Force personnel to employ to enhance their professional competence.

Participation in the *Air Force Fellows Program* in lieu of resident PME should be the result of specific selection, with the program tailored to provide strategic-leadership enhancement to the individual officer. Almost all of the host institutions for research-oriented fellowships provide an automatic strategic focus to the program, with the added opportunity for the officer to become deeply immersed in the chosen research topic. Further, the non-DOD fellowships, particularly White House and Legislative Fellowships, provide an unmatched opportunity for deep strategist immersion. Extensive exposure to strategic thinking through a fellowship can provide true "icing on the cake" for strategist development within an otherwise operationally focused officer, and the Air Force should institutionally ensure that its people take full advantage of this unique opportunity by increasing attention on the selection and outplacement of its Fellows.

The *General Officer Capstone Course* should provide a brief finishing school for senior strategists—a specific security-policy tutorial focusing attention on direct participation in policy and strategy within joint and interagency processes. The emphasis should be on the roles of senior leaders and opportunities for responsible presentation—even advocacy—of military options in the national interest, particularly the unique promise and limitations of aerospace power.

PME is central to the development of strategically competent leaders and strategist specialists. A strategist focus can best be ensured through horizontal integration of the curricula at each level, infusing strategic lessons into existing cases and instruction—cutting across the academic stovepipes of separate curricular focus such as communications, leadership, military studies, and so forth—rather than creating new categories or hours. It should also ensure smooth vertical integration, building from one level and program smoothly to the next without gaps or artificial divisions between operational and strategic levels of emphasis. This two-dimensional integration should also ensure full incorporation of the nonresident school programs and of the special programs such as SAAS and the Fellows. PME should establish a strategic framework early in the officer's career so that each subsequent operational and educational experience can extend and fill out that framework toward strategist competence. Finally, PME must also ensure full diagonal integration, with joint PME not a unique experience in terms of strategist focus but simply one other avenue toward strategist exposure. Aerospace power cannot be a separate focus but must be fully incorporated into strategist development, certainly by Air Force PME and through educational panels and channels into joint PME as well.

*Continuing Mentorship, Self-Study, and Guided Research: The Finishing Touch of Strategic Professionalism*

It is critical to formally prepare both lieutenants and colonels—and all ranks in between. However, strategist preparation also requires less formal mentorship, as well as self-study across an officer's entire military career.[15] As General Galvin put it, "A look at history will show that *highly motivated self-development* is the key to producing the best strategists. We need to foster and nurture this" (emphasis in original).[16]

**Mentorship and Self-Development.** Perhaps the best way to "foster and nurture" individual development is through both formal and informal mentorship. Commanders and supervisors should mentor their subordinates on more than directly job-centered topics, including imparting strategic perspective and motivating self-study efforts. Every Air Force leader should endeavor to inspire and develop two or three qualified (and improved) replacements. Further, those leaders with advanced strategic competency should work hard to ensure that they pass on that knowledge and perspective to both peers and subordinates—everyone whom they influence. The Air Force should provide materials and guidance, including the materials used in the formal education programs noted above, to support active mentoring. Ultimately, however, individual effort will mark great strategists—those who can go beyond formal education to read, analyze, and internalize strategic vision and wisdom. This too must be supported with materials that the individual can easily access and use to advance strategic knowledge.

**Guided Research.** Research is a great teacher. The researcher cannot hide behind surface, short-term skimming but must delve deeply into the subject. Thus, that researcher will learn more in one application than in a hundred books, and strategic research will provide selective depth and enhanced, demonstrated expertise. Mentoring and guidance are also extremely valuable here, particularly as the operationally experienced officer makes the leap into the strategic arena for the first time.

*Institutional Investment*

Behind all of the formal and informal programs and efforts above lie the requirements for specific and serious Air Force commitment and human-resources investment.

**Educational Materials.** One fundamental requirement is the provision of materials. As cited above, the educational materials from all Air Force schools should be made available to as wide a professional audience as possible. Air University Press plays a key role here, and that role may need to be expanded in selected areas such as the strategist arena to meet specific institutional requirements. Other Air Force publishers, including USAFA academic departments and Air Force research institutes, can also contribute to this effort. The Air Force should institutionally expand the Chief's Reading List to incorporate a wider range of rank-appropriate leader and strategist-development materials and should resource participating Air Force publishing entities to support the effort.

**Educational Methods.** Ongoing research is determining optimal distance-learning programs and techniques, and both materials and programs to use those materials should be developed and fielded to support officer development within an expeditionary force. Again, centralized commitment and resourcing are needed for this effort to succeed.

**Faculties and Facilities.** Human-resource development does not traditionally compete well when in competition with operational and systems-development imperatives. But effective leader-strategist development rests on effective curricula, materials, and faculties. We need to fully value their contribution and ensure their resourcing—including recognition that faculty duty must be a career-enhancing experience. Too often we prevent our best officers from serving as formal developers of other leaders. If we want the best, we must be willing to free up some of our best to develop the next generation. We must also value those who are willing to make what are

today significant career sacrifices to lead our educational programs. To cite General Galvin one last time, "We must create incentives to keep the best teachers for extended terms. Service as an instructor should be a prized assignment."[17]

**Institutionalization.** A one-time, short-term "pass" at enhanced leader-strategist development is not enough. In the end, such development requires a strong institutional investment and commitment—quality leadership requires enduring investment. We are the world's best aerospace force, and we owe it to ourselves not only to continue as the best, but also to improve and advance aerospace power to enhance the national interest. We need to consciously develop people with strategic vision to lead the way.

## Conclusion

This article is intended as a foundation for further discussion and analysis, to anchor a debate toward continuing update and review of the preparation of Air Force strategic leaders for the military and the nation. It is "not intended to provide [an] . . . ideal process for formulating or mastering strategic art." Its purpose "rather is to emphasize that the search itself is important, permanent, and worth our best efforts and attention at a time when familiar landmarks have vanished and no new strategic vision has attracted a national consensus."[18] The need for deliberate development of Air Force strategic leaders was highlighted by General Ryan in chartering the Developing Aerospace Leaders initiative: "While our Air Force has revolutionized warfare and proven that aerospace power, when employed by a motivated and highly skilled force, is an instrument of power to be reckoned with, we cannot be complacent. Because the leadership skills to forge the many aspects of aerospace into a coherent fighting force are critical to success, we must continue to attract, retain, and develop officers with the competencies to lead the Air Force in this dynamic, changing environment."[19] Strategic perspective and enhanced political-military competency are at the center of that developmental effort. Thus, the debate is worth the effort, and the time to decide how best to meet that end is now.

So it is clear that we need to build deep and broad political-military competencies toward the development of aerospace strategist-leaders. This was evident to a greater degree than at any earlier time in history at the height of the cold war, when every military action had profound political implications and potentially catastrophic consequences. It was even more evident in the late 1980s, when the provisions of Goldwater-Nichols placed the chairman of the JCS—and to only a slightly lesser degree, the regional CINCs—in direct political-military advisory roles to the National Command Authorities. And it is most evident today in the face of the dynamic ambiguities of the post-cold-war international-security environment, where some have seen the key to success as having commanders who are thinkers over doers. This analyst takes that a step further to claim that the requirement is for thinking doers—aerospace officers who are at once operationally expert and politically competent—as true strategic leaders. The nation requires informed military advice, and today it demands informed aerospace advice to best advance and defend the national interest. The Air Force must prepare its leaders to respond effectively. □

**Notes**

1. Gen Michael E. Ryan, "Developing Aerospace Leaders Charter," 13 October 1999.

2. See, for example, the following security-environment forecasts: *Concept for Future Joint Operations: Expanding Joint Vision 2010* (Fort Monroe, Va.: Joint Warfighting Center, 1997), 8–10; William S. Cohen, *Report of the Quadrennial Defense Review* (Washington, D.C.: Department of Defense, May 1997), 3–5; *Transforming Defense: National Security in the 21st Century* (Arlington, Va.: National Defense Panel, December 1997), 5–17; Ronald R. Fogleman and Sheila E. Widnall, *Global Engagement: A Vision for the 21st Century Air Force* (Washington, D.C.: Department of the Air Force, 1996), 1–5; Robert H. Scales Jr., *America's Army: Preparing for To-*

*morrow's Security Challenges*, Army Issue Paper no. 2 (Carlisle Barracks, Pa.: US Army War College, November 1998), 1–6; and *New World Coming: American Security in the 21st Century* (Arlington, Va.: United States Commission on National Security/21st Century, 15 September 1999).

3. Aaron Wildavsky, "The Two Presidencies," in *Perspectives on the Presidency*, ed. Aaron Wildavsky (Boston: Little, Brown, 1975), 448–61. Subsequent studies traced a narrowing to little if any difference between foreign and domestic issues in the post-Vietnam era.

4. Randall B. Ripley and Grace A. Franklin, *Congress, the Bureaucracy, and Public Policy* (Homewood, Ill.: Dorsey Press, 1980).

5. Robert Jervis, "US Grand Strategy: Mission Impossible," *Naval War College Review* 51 (Summer 1998): 22–36.

6. "Damage Assessment: The Senate Rejection of the CTBT," *Arms Control Today*, September/October 1999, 14.

7. Ryan.

8. See Howard D. Belote, *Once in a Blue Moon: Airmen in Theater Command*, CADRE Paper no. 7 (Maxwell AFB, Ala.: Air University Press, June 2000), for a comprehensive discussion of the competencies required of the most senior joint military leaders today. He identifies three essential "baseline" CINC attributes as leadership, broad professional competence, and political-military awareness and ability. Similarly, see Maj Gen Richard A. Chilcoat, *Strategic Art: The New Discipline for 21st Century Leaders* (Carlisle, Pa.: Strategic Studies Institute, US Army War College, 10 October 1995), 3, for his development of the same three essential attributes developed as strategic leader, strategic practitioner, and strategic theorist.

9. Field Manual (FM) 100-20, *Command and Employment of Air Power*, 21 July 1943, 2.

10. Theodore J. Crackel, "On the Making of Lieutenants and Colonels," *The Public Interest* 76 (Summer 1984): 18.

11. Gen John R. Galvin, "What's the Matter with Being a Strategist?" *Parameters* 19, no. 1 (March 1989): 2 (reprinted in *Parameters* 25, no. 2 [Summer 1995]: 161–68). Subsequent references are to the 1989 version.

12. Ibid., 10. For a detailed discussion of precommissioning strategist education, see Daniel J. Kaufman, "Military Undergraduate Security Education for the New Millennium," in *Educating International Security Practitioners: Preparing to Face the Demands of the 21st Century International Security Environment*, Special Report, ed. James M. Smith (forthcoming).

13. See Robert H. "Robin" Dorff, "Professional Military Security Education: The View from a Senior Service College," and Linda P. Brady, "Professional Schools of International Affairs: Preparing National Security Practitioners for the 21st Century," both in Smith (forthcoming), for detailed discussions of senior PME and civilian graduate education, respectively, as these programs contribute to strategist preparation.

14. Almost all graduate programs are valuable experiences, but applied programs such as those offered by schools that subscribe to the Association of Professional Schools of International Affairs (APSIA) directly apply to military-strategist practice.

15. See James M. Smith, "Educating International Security Practitioners: The Role of Research Centers and Professional Outreach Programs," in Smith (forthcoming), for a detailed discussion of the linked roles of strategic research and outreach education in strategist development.

16. Galvin, 9–10.

17. Ibid., 6.

18. Chilcoat, 1.

19. Ryan.

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*The rebellions of the belly are the worst.*

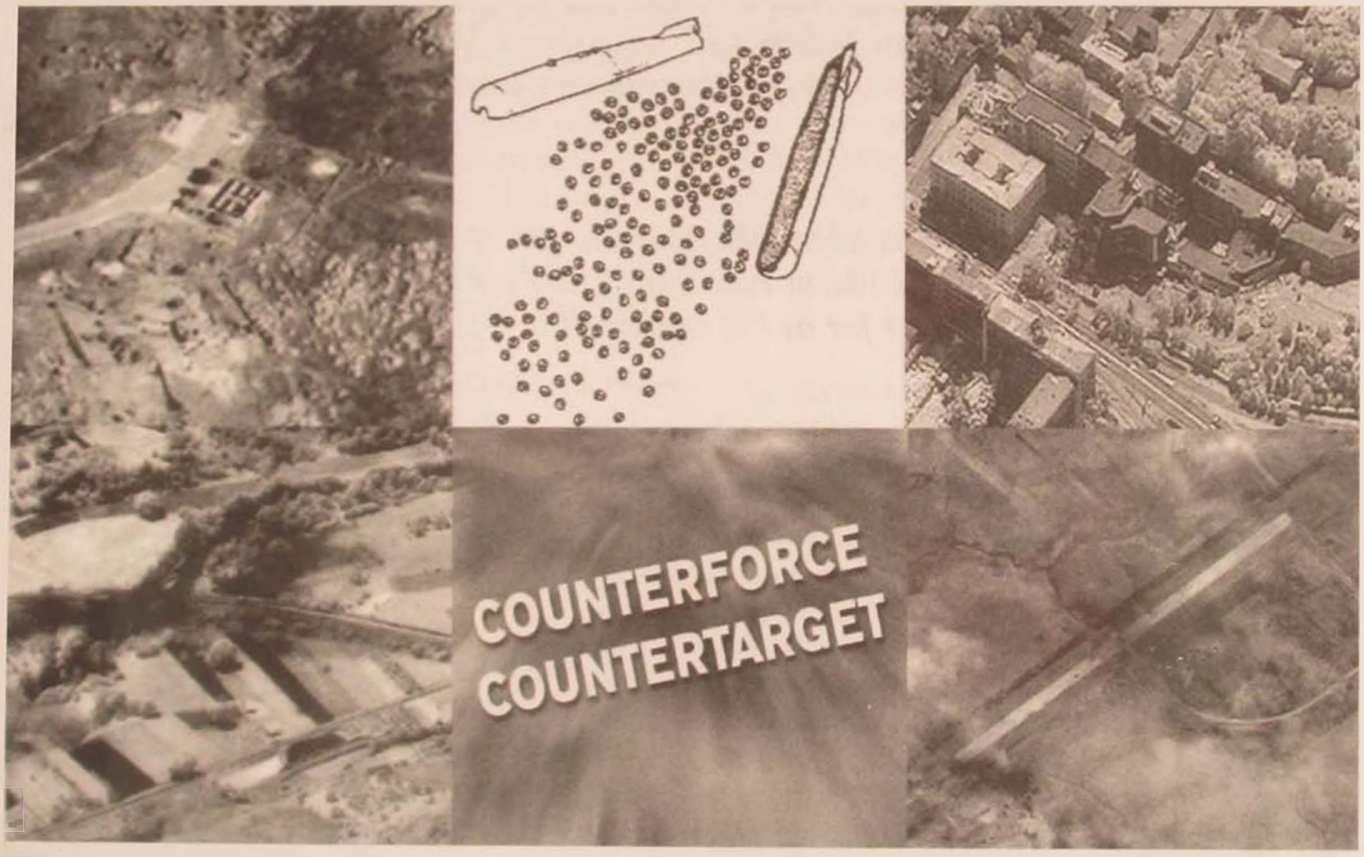
—Sir Francis Bacon, 1561

# Beyond Utility Targeting

## Toward Axiological Air Operations

Lt Col Peter W. W. Wijninga, Royal Netherlands Air Force
Richard Szafranski

*Editorial Abstract: A hot topic in aerospace discussions today is targeting—what, where, how, and when to do it in order to achieve the desired effects. This piece argues that today the dominant mechanism and measurement for targeting is industrial-age utility and that in the future an equally important method should be targeting based on adversary leaders' values, depriving or holding at risk their ability to fulfill human needs.*




*The outcome of the air war was the destruction of the Kosovo we wanted to safeguard, renewed political tensions between the U.S. and Russia and an open-ended deployment of peacekeepers.*

—Adm William Owens, US Navy, Retired

*The single most important lesson of the conflict is that there is no cheap, easy way to prevent genocide or mass killing. Airpower alone will not generally determine what transpires on the ground. Only when paired with ground forces—and only if used decisively—can airpower be expected to work.*

—Ivo H. Daalder and Michael E. O'Hanlon

*The targeting process in Operation Allied Force was incoherent and inept.*

—Dr. Earl H. Tilford

*In an extraordinary paradox, a war based on the notion of discriminate force using dazzling information-age technology—B-2 bombers, cruise missiles, and joint direct-attack munitions—sacrificed the Albanian Kosovars to indiscriminate death at the hands of Serb forces using methods we associate with the Dark Ages. In humanitarian terms, the air war was an unmitigated disaster, and a cautionary warning for the West in employing force in future intra-state conflicts. This humanitarian failure will not prevent Western air force theorists from arguing that the war was a decisive victory for air power.*

—Dr. Michael Evans

*If there's somebody in this town [Washington, D.C.] who can speak to lessons learned from Kosovo, I'd like to meet him. There are lessons from Kosovo, but nobody's learned them, as far as I'm concerned.*

—Lt Gen Michael C. Short, USAF, Retired

*"He's finished!"*

—Placards at postelection rallies in Belgrade
28 September 2000

AND SO IT goes, continuing even with Slobodan Milosevic unseated. Airpower advocates argue, as they must, that Kosovo was an air war and that airpower "won" this war in Kosovo.[1] Critics, as is their wont, argue otherwise. Sides count and dispute the numbers of bomb craters, the catastrophic kills of tanks and armored personnel carriers and decoys, and make their cases for the danger or usefulness of "gradualism."[2] The debate remains heated, yet our aim is to enter this debate indirectly, if at all.

Our entry point is targeting. We probably take a rather broader view of targeting than others. To us, targeting is the activity that transforms a theory of conflict or conflict termination into behaviors—diplomacy, coalition-building, propaganda, engagements, strikes, electronic combat, cyberwarfare, and supporting activities—that intend to affect the

targeted objects and thereby intend to prove the theory's hypotheses. "Targets" in this view are the objects that our behaviors aim to affect.[3] In our analysis we identify a target for diplomatic engagement just as we identify a target for an air strike. We engage neutrals. We entice allies. We attack tanks. The success or failure of each of these activities, to the degree that they are congruent with the larger theory of conflict or conflict termination employed, conditions or determines our judgment as to whether, at the end of the day, we have won or lost.[4] Whether or not the allies "won" and Milosevic "lost," or the allies won and Milosevic won too, or both the allies and Milosevic lost, the air war resulted in the testing of a theory, or perhaps theories, of targeting.[5]

Weighed in the balance, our hypothesis is a simple one. We argue that today the dominant mechanism and measurement for targeting is industrial-age (or "second wave") utility and that in the information-age (or "third wave") future, an equally important method should be targeting based on value. Today we target infrastructure to deny warfighting utility. Tomorrow we should target to deprive leaders of the capacity to meet their needs: things that leaders must value.[6] We must move beyond utility targeting.

## Theories of Targeting

We call our concept "axiological aerospace operations," and we assert the need to move airpower "toward" that capability. *Axiology* is a fancy word, the combination of the Greek *axios* meaning "worthy" or "of like value" and *logos* meaning "reason" or "theory." Axiology is the study of values—the philosophical investigation into the nature, criteria, and metaphysical status of value. We contrast value and values to "utility." In decision theory, as in our conception, "utility" and "value" are different, and each is quite complex.[7] *Utility,* as we use it, simply means future usefulness, fitness for some chore, or the capacity of real objects to produce a resource or resources useful to the adversary. *Value* is the relative worth resident in an object. The philosopher Risieri Frondizi describes value and values as follows:

> It would be more appropriate to assert that values are "unreal qualities," although not ideal, inasmuch, as we have seen, they do not add reality or substance to objects, but only value. Regardless of the designation, what is certain is that values are not things nor elements of things, but properties, qualities, sui generis, which certain objects called "goods" possess. . . . Because they are qualities, values are parasitic beings which cannot live without being supported by real objects, and lead a fragile existence, at least while they are adjectives related to "goods."[8]

Current operational theories such as "full spectrum dominance," "rapid halt," "rapid dominance," and "rapid decisive operations" are the manifestation of theories of conflict resolution.[9] They ascribe value to speed, to the ability to exercise control across a spectrum of activities, and to the ability to force a decision. But unless there is a change in the logic of targeting, none of these theories is likely to be proven in future conflicts. Why?

## Utility Targeting

In second-wave or industrial-age warfare, the way we made war was the way we made wealth.[10] Societies made their wealth through mass production, and the machine metaphor or engineering paradigm dominated the thinking of second-wave societies. The second wave created "mass societies that reflected and required mass production."[11] Carl Builder accordingly observed that second-wave societies valued "organization and discipline" simply because planning for mass production (to increase wealth) and producing mass warfare (to steal or protect wealth) required those values.[12] Standardization, rationalization, mass transportation, and all kinds of engineering become important when humans organize for mass production. Successfully waging war in the second wave required large capital investments, the *levée en masse,* military engineers, and a mass of killing machines and appliances.[13]

In the industrial age, warfare and serious fighting were the work of states. Only states could produce the "stuff" that large-scale warfare required: trained troops, small arms, mortars, artillery, ships, trains and vehicles, tanks, armored personnel carriers, and combat and transport aircraft. For each of these there are corresponding "anti" systems: antipersonnel mines, antiaircraft artillery, countermortars, antitank weapons, mines, and attack submarines. These are concrete, tangible things. They are the tools of aggression or defense that can be seen and counted. The Red Army ascribed "tactical-technical" characteristics to each of these concrete objects. In the age of mass, "more" usually was believed to be "better" than "fewer." When the "more" was widely distributed or garrisoned among the civilian noncombatants in the warring populations, collateral damage was likely.

Thus, war in the age of mass, the industrial age or second wave, tended to be state-versus-state total war. By "total" we mean, for example, that airpower killed more civilians in Germany than all American and British (including Commonwealth) wartime casualties, and in "Japan more people were killed in six months of heavy aerial bombardment than in the whole United States war effort."[14] Some have argued that superb generalship did not "win" World War II for the Allies. Mass production and brute force did.[15] John Ellis notes that "the prosaic arithmetic of natural resources, generating capacity, industrial plant and productivity was to be incontrovertible."[16] It was only natural then that weapons of mass destruction arose as the "anti" for an adversary's mass production capacity. Targeting aimed to destroy the usefulness of an enemy state's industrial plant. Targeting theory pivoted, and pivots today, on what may be an antiquated or at least incomplete theory of conflict and conflict resolution: how to make states stop fighting.

The epitome of utility targeting theory probably is found in the influential thinking of John Warden.[17] Warden's views invigorate airpower thinking, especially in the United States, and illustrate what may be the zenith of standardization, rationalization, and engineering thinking. The enemy can be reduced to a standardized targeting template because it can be thought of as a "system" with categories of "things" or entities within the system to be targeted (fig. 1). Planning is apprehending or estimating calculable cost-benefit ratios.[18] Targeting was and is about identifying and destroying adversaries' means of production, whether those things being produced were the system itself, war materiel, or lethal force. Targeting attacks key nodes in each of the categories in "parallel," striving to rapidly induce systemic paralysis. Yet, Warden accepts that

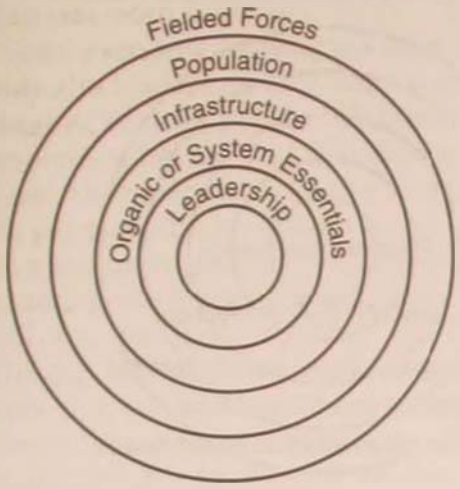
> the object of war is to convince the enemy leadership to do what you want it to do. The enemy leadership acts on some cost/risk basis, but we can't know precisely what it might be. We can, however, make some reasonable guesses based on system and organization theory. To do this, put yourself in the center of the five rings as the leader of a strategic entity like a drug cartel or state. You have certain rather basic goals that normally will take precedence over others. First, you want to survive personally (this is not to say you won't die for your system, but you probably see yourself and the system as being closely tied together). For you to survive personally (in most instances) the system you lead must survive in reasonably close to its present form.[19]

We agree that the aim of war is to convince the enemy leadership to do our will, and we believe that the key to compelling the enemy leaders is targeting what the leaders at every level value. Our intention in making this assertion is not to illuminate all the shortcomings of utility targeting theory. Rather, it is to suggest another way to think of targeting. We call this value targeting.

## Value Targeting

The thing that differentiates the "system" that is a belligerent nation or militarily aggressive group is that these are human organizations. The philosopher-historians Will and Ariel Durant go so far as to say that

The enemy is a system that must be rendered dysfunctional or paralyzed.




"Enemies, whether they be states, criminal organizations, or individuals, all do the same thing; they almost always act or don't act based on some kind of cost-benefit ratio. The enemy may not assess a situation the way we do, and we may disagree with his assessment, but assessments are part and parcel of every decision. From an airpower standpoint, it is our job to determine what price (positive or negative) it will take to induce an enemy to accept our conditions."

*Source:* Adapted from Col John A. Warden III, "Air Theory for the Twenty-First Century," in Barry R. Schneider and Lawrence E. Grinter, eds., *Battlefield of the Future: 21st Century Warfare Issues*, rev. ed. (Maxwell AFB, Ala.: Air University Press, September 1998), 106, 108.

**Figure 1. Targeting According to Utility**

> our states, being ourselves multiplied, are what we are; they write our natures in bolder type, and do our good and evil on an elephantine scale. We are acquisitive, greedy, and pugnacious because our blood remembers millenniums through which our forebears had to chase and fight and kill in order to survive and had to eat to their gastric capacity for fear they should not soon capture another feast. War is a nation's way of eating.[20]

States are "systems," of course, but more importantly they are complex human organizations. Moreover, states are not the only complex human organizations with the capacity to do harm—witness terrorist groups and genocidal ethnic factions. These groups are organized to survive and to fulfill a set of functions unrelated to survival. For example, maintaining an army or a national air force is related to the survival of a nation, but having a national health-care system or maintaining a zoo or public park in a town's center is related to the survival of the state only indirectly. Likewise, the nonstate Hezbollah has an armed force, but it also maintains a social services infrastructure and runs a Web site.[21]

States must insure that their populace has the basic necessities for life, among which are food, water, and perhaps even unpolluted air. To fulfill these basic requirements for life, states must have some territory, some place to grow food, and a more or less secure environment in which the people live. A state must provide its citizens protection from other states, just as a subnational group must afford its members protection. Although providing basic necessities is the government's role, or at least providing the environment in which the people can secure basic necessities, hostile groups and states, especially neighboring states, can threaten even this. (Today, for example, wealthy states like the United States and the Netherlands are unable to protect their people from ballistic missile attack should such attacks commence.)

Thus, states and groups must attend to their defense. When they attend to their defense, they produce "things" that are useful

tools for defense. Yet, to target and destroy the state's or group's tools is not a guarantee that it will be defenseless to the degree that it will cease fighting or readily do our will. Targeting its tools in the hope that these will compel an adversary to do our will seems to be refuted by the facts. Thus, there needs to be another scheme for targeting. This new scheme actually may be an old one provided by Abraham Maslow, who attempted to classify needs relevant to individuals and to organizational behavior.[22]

## Enter Maslow and Unfilled Needs

Maslow's "hierarchy of needs" formulation suggests that we have a prepotency of needs; that is, some needs are assumed to be more important or potent than others, and those that are the most important must be satisfied before the other needs can serve as motivators. He postulated five categories. At the basic level are the physiological needs such as thirst, hunger, and sex drives. To satisfy this level of needs, we hunt for food, breed cattle, grow crops, dig wells, and look for mates. When these basic needs have been satisfied, the next higher level becomes a more important motivator; the level of safety and security needs, which is represented by freedom from fear of external harm, climatic extremes, or criminal activity. To satisfy this level, we build tents, huts, and houses; we organize ourselves in tribes, villages, cities, states; we establish policing forces and armies; and we formulate rules and laws. The next higher level corresponds with belonging and social activity or affiliation needs. This level motivates us to undertake action in exchange for support, affection, and friendship. The fourth level represents our drive for esteem and status; it makes us strive for status and respect, adopt behavior to get access to and be accepted by those we admire. At last, when all previous levels of needs have been fulfilled to our satisfaction, we strive for self-actualization, for self-realization and fulfillment (fig. 2).

In the great wars of the twentieth century, Western nations fought against what they believed were totalitarian states. The scores of minor conflicts that have occurred since the end of the cold war have continued that trend. This means that in the future, and likelier than not, democratic regimes will be pitted against totalitarian regimes or leaders in "rogue states."[23] Democratic values, shared by many, will compete with totalitarian values, shared by few. In modern Western democracies such as the Netherlands and the United States, most of the respective populations have achieved all of Maslow's lower levels of the hierarchy of needs, and many are striving to fulfill the need for self-realization. In a country such as North Korea, however, there is evidence that the basic needs for food are not provided for all. On the other hand, if we look at a country such as Serbia, we see that the basic needs for food and water had been fulfilled for all, yet the higher-order needs probably had been fulfilled only by Milosevic and his small circle of "cronies." Authentic "safety and security" are scarce commodities in a totalitarian system. Freedom of speech, movement, information, and assembly were


*Source:* Adapted from Abraham Maslow, *Motivation and Personality* (New York: Harper and Row, 1954)

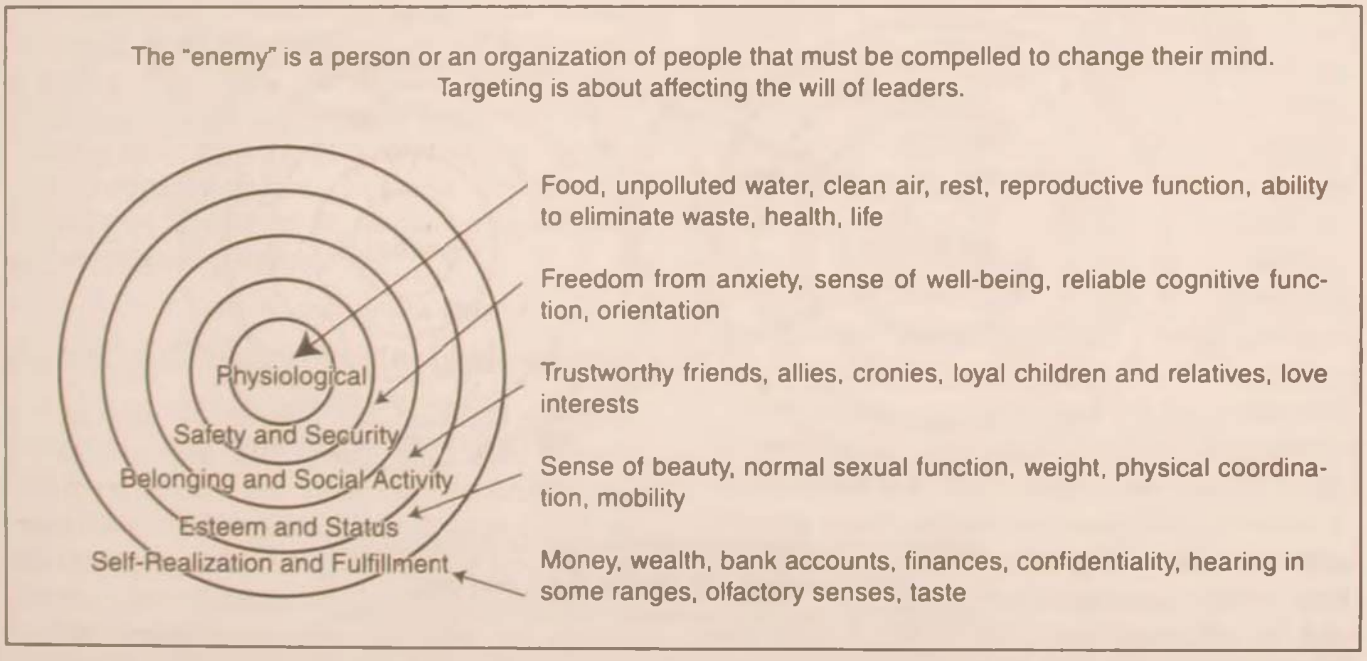
**Figure 2. Targeting According to Value**

denied to large groups of the population. Democratic values have been shared by many in that totalitarian system, but they certainly had not been fulfilled.

Yet, even in a totalitarian state or group system, the leaders cannot wage war without the support of their people. This may sound contradictory, but the fact that during the Kosovo crisis Milosevic devoted the larger portion of his propaganda campaign to his own population seems to support this observation. While a totalitarian leader is certain that he can control his people's actions, he is uncertain whether he has control over their minds. If he does not attempt to control their minds, he knows he may lose control over their actions in the long run. Denial of access to independent news sources and spreading misinformation over state-controlled media are ways of trying to influence the minds of the people—not only of his own people but also the adversaries' people. Apparently even totalitarian leaders value people's support; without it, the needs of the totalitarian leader cannot be met. Support, or at least acquiescence, is necessary—internally to keep his own people united and in support of the policies, externally to undermine adversaries. In sum, popular support is of high value even to the totalitarian leader.

Through Maslow's lens, popular support may reside at the safety and security level of leaders' needs. Safe and secure, the leader can then move up in the hierarchy to satisfy the need for belonging and social activity, or affiliation, where he can then expand his small circle of friends and feel even more secure. If needs at this level are met, the need for satisfying the next higher level—esteem and status—becomes a powerful motivator. Finally, the leader will strive to satisfy the need for self-realization. All the while, leaders will act to avoid danger to their "selfish genes" to get food and to have the capacity to reproduce (fig. 3).[24]

Compelling the misbehaving leaders of an adversary state or group to do our will requires that we understand and engage what



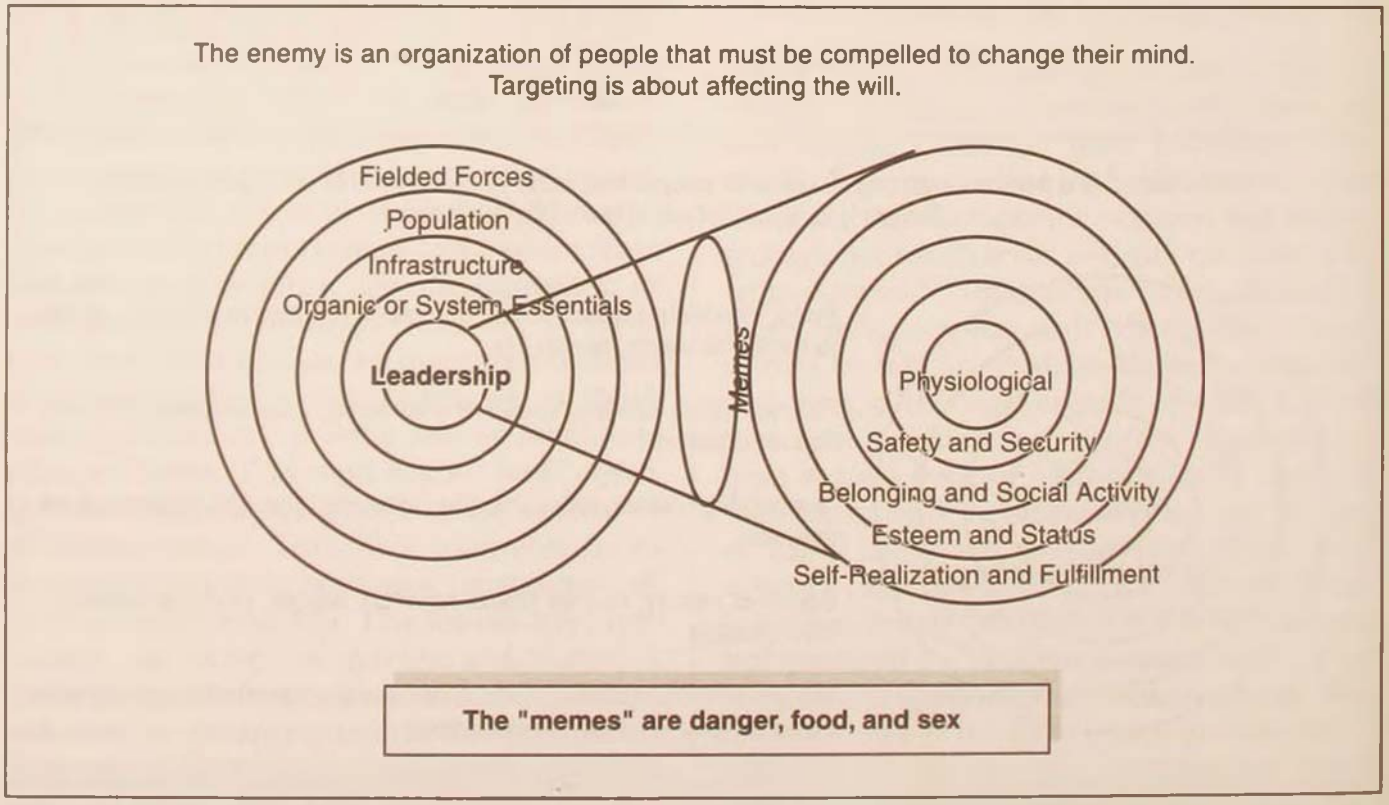

*Source:* Adapted from Abraham Maslow, *Motivation and Personality* (New York: Harper and Row, 1954)

**Figure 3. Value Target Sets**

the enemy's leadership needs and therefore values. It then becomes our job to deny the ability to meet those needs, to attack what leaders value, either electronically or by use of kinetic force. Moreover, we believe that this must be done quickly and repeatedly to rapidly force the behavior shift that signifies that a leader has had a change of mind.[25]

Although there is at least one report that this method of targeting (pejoratively called "crony targeting") was used in Operation Allied Force, the advantages of value targeting may not be appreciated fully yet.[26] The objective of this kind of targeting is to focus attention on the national or group leader and leaders at every influential level and to target, or engage, or hold at risk leaders and what leaders value. Thus, each of these elements—leadership's physiological needs, safety and security needs, social and affiliation needs, esteem needs, and self-actualization needs—and all residing in the neocortex, can be engaged in parallel (fig. 4).[27] The advantages are that value targeting can be done in peacetime and that it can be escalated dramatically in wartime.

The elegance of utility targeting is that it is simple to understand and simple to execute. In fact, its only shortcoming as a theory or in practice may be that it does not always work against all adversaries.[28] Destroying stuff, even to the point of significantly diminishing the utility of a war-fighting system, does not necessarily stop belligerence. The leaders or the people may still misbehave. Value targeting, on the other hand, while more difficult to comprehend and riskier to execute, may increase the likelihood of conflict resolution.[29] It is riskier because it requires awareness that conflict termination brings about




*Source:* Adapted from Richard Brodie, *Virus of the Mind: The New Science of the Meme* (Seattle, Wash.: Integral Press, 1996)

**Figure 4. Targeting According to Utility and Value**

what Watzlawick, Weakland, and Fisch call "a second-order change" in the enemy's leaders.[30] That is, belligerence intending to fulfill some higher-order need, to secure some desirable objective, will actually result in the deprivation of a more basic need and with it the loss of some more desirable objective. Said another way, occupying Kuwait may satisfy the self-actualization needs of a neighboring nation's miscreant leader, but it might also risk the ability to satisfy some lower-order need that the leader has, like the physiological need to continue breathing. Stealing a purse may be intended to satisfy a gang leader's need for esteem, but a purse owner protecting the purse with a concealed handgun may risk the gang leader's life.

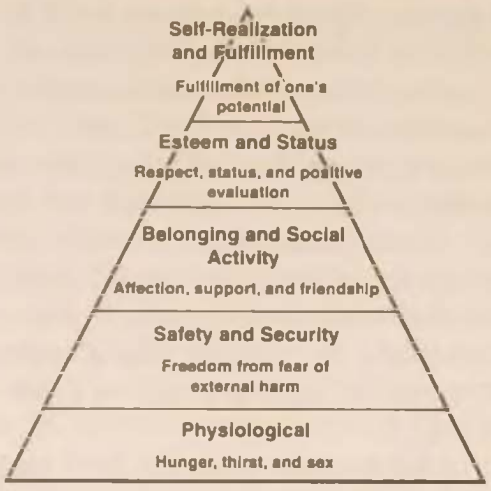
We conclude that the right combination may be value targeting of leadership at every level and utility targeting of those valuable—useful to helping meet needs—military targets that can be engaged. By "engaged" we mean "affected." The means of affecting them can be lethal and catastrophic, or nonlethal.[31] The goal of utility targeting remains to eliminate infrastructure—war-fighting or war-supporting tools. The goal of value targeting is, while eliminating or in some cases even ignoring the utility of leaders' war-fighting tools, to attempt to change their behavior by holding their more highly valued but "lower" and stronger needs at risk. We believe that this may be best done by conducting axiological aerospace operations.

## Axiological Aerospace Operations

The aim of axiological aerospace operations is to use air, space, and information power to force a behavior shift in belligerent leadership in the quickest and most economical ways possible. Why aerospace forces and why airpower? Because airpower—air, space, and information power—has the reach and potentially has the technological tools to do this remotely, to conduct expeditions against adversary leaders from afar.[32] The effect of this shift may be interpreted as coercive, and indeed it is, but we must admit that is an interpretation derived from trying to name those things which caused the behavior shift or appear to have been in evidence when and after the shift occurred. Said another way, the precise mechanisms may be invisible or barely visible to any but the target of the engagement. Since historical measures of utility—enemy tanks destroyed, aircraft downed, enemy troops killed—are not the only or the most useful measures that apply, our current understanding of coercion and of using aerospace forces to apply it requires some maturation (fig. 5).

Let us begin that maturation by going far afield and then returning to the center. Let us consider states and their leaders. This is far afield, we believe, because these are the least likely threat in the future. Even so, most democratic nations forbid the assassination of heads of state. They do not seem to forbid the killing of the head of a subnational "group" or an enemy head of state when that head of state is also the commander in chief of the enemy armed forces in wartime. Moreover, the statutes that forbid assassination of a head of state do not seem to prohibit other forms of hurt. For example, in wartime there is no prohibition against causing an enemy head of state to be hungry, or anxious, or depressed. Assassination is inflicting mortal injury. Would not some lesser form of injury, such as maiming, be allowed? That is a thought at the edge of the envelope. Closer to the center, but still a second-order change in the way we think about targeting, are the target sets of value targeting.

In addition to engaging (but not necessarily destroying) the kinds of targets depicted in the illustrations to achieve these kinds of effects in state-to-state warfare, Col Charles J. Dunlap Jr., USAF, theoretically adds "resorts, along with other entertainment, sports, and recreational facilities," and "factories, plants, stores, and shops that produce, sell, or distribute luxury products or, indeed, anything not absolutely indispensable to noncombatant survival" along with "their associated logistics systems."[33] Dunlap's targets are value




Targets: wealth, bank accounts, finances, confidentiality, hearing in some ranges, olfactory senses, taste

Targets: sense of beauty, normal sexual function, physical coordination, mobility

Targets: friends, allies, cronies, loyalty of children and relatives, love interests

Targets: sense of well-being, reliable cognitive function, orientation

Targets: food, water, clean air, rest, reproductive function, ability to eliminate waste, health, life

*Source:* Adapted from Abraham Maslow, *Motivation and Personality* (New York: Harper and Row, 1954)

**Figure 5. Targeting Using Maslow's "Hierarchy of Needs"**

or "values" targets engaged essentially in the same way utility targets are engaged.

## Dangers

No targeting schema is without risks. Some are obvious, some more subtle. The predominant risk associated with utility targeting is that enemy leaders may not use or value their stuff in the same way we use or value our stuff. We might find ourselves (and usually do) "mirror-imaging" the adversary and puzzled when our notions of causality are frustrated by effects not achieved. Surely we have learned to live with this risk; even today "intelligence" is dominated by "counting" and not by "measuring effects." The more subtle and more critical risk is that we remain mentally and militarily unprepared for value attacks against us. For example, how would we cope with a deliberate attack on Disney World? Worse, how would we cope with a televised mass suicide of hundreds of people killing themselves rather than dying at the hands of allied airpower?[34] How would we cope with a totalitarian leader who surrounds himself or herself with hundreds of women and children wherever the leader felt at risk? Our values—our need for esteem or affiliation—would be held at risk in such a case.

The dangers of value targeting are more numerous. First, we have an immature understanding of what others, including other cultures, value. Second, even if we understand what the main leader values, we may not understand what an adversary successor values. Third, there are leaders at every level and in many categories. Fourth, we may encounter the leader-sociopath, bereft of values, quite willing to live underground in hiding and insensitive to the absence of human comforts upon which others depend. Finally, we may find ourselves transformed by the process of understanding and attacking the lives and minds of adversary leaders. In hunting the sociopath, we may become pathological.

## Mitigating the Dangers

Some dangers can be mitigated, and some cannot. To try to mitigate these dangers, we must begin the process of trying to better understand national and group leaders everywhere, but especially in those states, among

those groups, and in those geographical areas where success eluded us in the past: the Balkans, Iran, Iraq, North Korea, and some places in Africa. Next we must capitalize on the attributes of the third-wave information age and the global connectivity that characterizes it. Just as there is a movement toward "transparency" in the physical realm, there is a corresponding move toward greater visibility and greater intelligibility in the psychological realm.

Every move or action in the physical world, either directly or through proxies, is an indication of "revealed preference," or value. One's investment portfolio, for example, reveals one's preferences for risk, the value one places on risk and return. One's choices of books, or automobiles, or friends telegraph one's values. The meals one eats, the restaurant one frequents, and the places one avoids all illuminate value and values. Concerns regarding privacy on the Web are motivated by awareness of the revelations each of us makes through our actions. If there are 10 worrisome countries and each has 50 worrisome leaders with two potential successors each, that is a mere one thousand value-analysis problems to begin solving. A more difficult problem to solve is the problem of the leader-sociopath. These leaders may just have to perish.[35]

And lastly, to avoid becoming sociopathological ourselves, only a few well-chosen, adept, sinister, and Machiavellian people need to be engaged in value targeting: constructing the strategies and operational plans aimed at forcing a behavior shift in adversary leaders. Executing the engagements is, for the most part, a series of mechanical tasks, few of which are unfamiliar to some element of government. Whether bombing an unoccupied "resort" in Dunlap's theoretical scheme or bombing a factory, there should be no doubt that we know how to bomb and have the technology to bomb well. We suspect we have all the means necessary for robust value targeting too, but the mind has yet to move the mass.

## Some Risks of Focusing on Utility Targeting Alone

It is not an intractable problem to count tanks and troops and missiles and, given political will, courage, and technology, it is possible to strike them, as allied airmen demonstrated. But one must be prepared for the real likelihood that the actual utility of these target-objects of utility targeting may diminish in the future and that there may be substitutes for some capabilities.[36] This is not a wild speculation. The United States Commission on National Security/21st Century (also known in the United States as the Hart-Rudman Commission) warns American leadership and the American people that

> many of the threats emerging in our future will differ significantly from those of the past, not only in their physical but also in their psychological effects. While conventional conflicts will still be possible, the most serious threat to our security may consist of unannounced attacks on American cities by sub-national groups using genetically engineered pathogens. Another may be a well-planned cyber-attack on the air traffic control system on the East Coast of the United States, as some 200 commercial aircraft are trying to land safely in a morning's rain and fog. Other threats may inhere in assaults against an increasingly integrated and complex, but highly vulnerable, international economic infrastructure whose operation lies beyond control of any single body. Threats may also loom from an unraveling of the fabric of national identity itself, and the consequent failure or collapse of several major countries.[37]

The target of the message is leadership in the United States, but the warning applies equally well to the Netherlands and the other open, democratic societies of Western Europe. The resulting problems caused by these "significantly" different threats are immense. How does one target the conventional war-fighting tools—the infrastructure, the industrial capacity, the aircraft, the tanks, and the troop formations—of subnational groups? How does one preempt or retaliate against cyber-attackers? How will we know where the stores of genetically engineered pathogens are, let

alone how will we know how to attack them? The answers, of course, are that we need new methods for new circumstances (fig. 6).

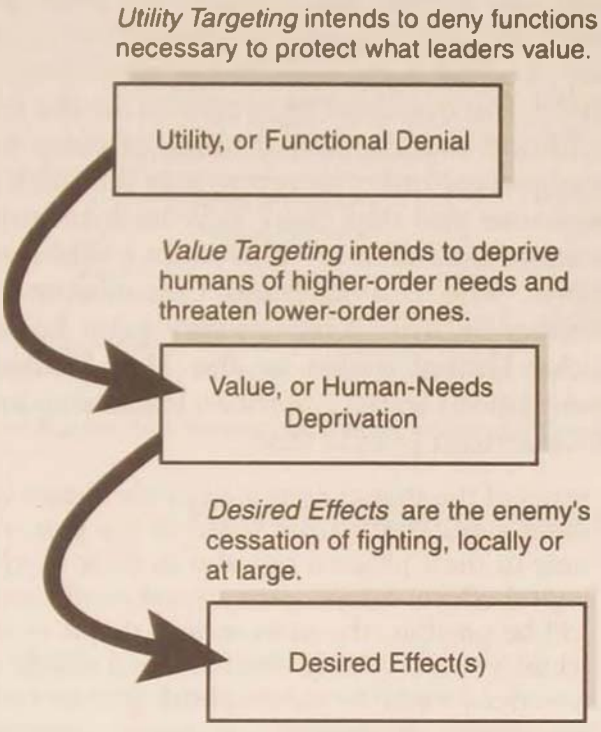



**Figure 6. Targeting for Effect and Effects**

## Achieving Desired Effects

The effects we desire from targeting are a cessation of fighting, either locally or totally. Utility targeting engages physical objects, presuming them to be of value to the adversary. Value targeting engages the minds and needs of leaders at all levels, knowing that they, and not their war-fighting stuff, are the real source of the conflict and its prolongation and the essential ingredient to its resolution. If we begin by utility targeting to deny functionality, we must do this with an eye toward threatening the adversary's ability to use "stuff" to meet some higher-order need. Thus, we actually do value targeting if we focus on the desired effect and if that effect is tightly coupled to the larger effect of changing the minds of enemy leaders. Today we work the problem from the bottom up: kill tanks to prevent the conquest of territory. We need to work the problem, as Warden has long argued, from the top down. In this case we would argue that we ought to "target" needs that lead to the acquisition or production of tanks. If we fail to prevent the acquisition or production of tanks, then we target the needs that might be satisfied by summoning their use in aggression. We believe we need to move forward with implementing the capability to do robust value targeting, to conduct axiological aerospace operations.

## Concluding Thoughts on Implementation

Imagine an axiological tasking order (AxTO) developed hand in glove with the more conventional air tasking order (ATO). Our ability to imagine is frustrated by awareness that the work of developing the staff of regional or area experts, psychologists, financial services consultants, media experts, communications specialists, physician-psychiatrists, and others needed to develop the target sets of value targeting probably are chores so different, so idiosyncratic when compared to fleshing out the utility targeting staff, that they are chores likely to remain undone, at least for awhile. The "interagency process" seems ill equipped to create a Bletchley Park,[38] dedicated not to enemy code-breaking but to enemy leader-breaking. Thus, the first steps are transitional steps. There are at least three of these transitional steps.

First, reexamine the effects of utility targeting in Desert Storm and in Operation Allied Force and compare its effects to the effects of any targeting done to engage the unconventional targets that the main leaders held dear.[39] It is necessary to include the main leaders—Saddam and Slobodan, respectively—but not sufficient to stop the analysis there. Said another way, test the relationship between the prewar or midwar conflict-termination theories that were given substance in actual targeting with the actual effects of allied behavior implementing the theories. Counting catastrophic kills may be necessary, but it is not sufficient. Counting is a meritorious en-

terprise only if one believes that destroying stuff is the essence of subduing another's will or changing another's mind.

Second, use the vehicle of war games to exercise different notions and variants of a cell dedicated to value targeting. Essential to these exercises is exploring ways the value targeteers might or should interact with the utility targeting staff. Analyze the target sets and engagement alternatives that the value targeting cell, alone and acting in concert with the utility targeting cell, developed and advanced in games. Upon identifying affinities and categories or classes of actions, vet and establish requirements for developing the engagement systems necessary to prosecute value attacks in the future.

Finally, look to the potentially misbehaving states and groups of the world to provide a fertile ground for actual value-targeting analysis. Then, begin the analysis. Understanding leaders in states will be relatively easier than understanding what substate and nonstate group leaders value and how they go about meeting their needs. After the analysis, the rest will follow apace. The "rest" is the happy future day when aerospace axiological operations and value-targeting contribute all that they can to deterring and resolving conflict. □

**Notes**

1. "The Vietnam War and the Press," *NewsHour with Jim Lehrer*, Public Broadcasting System (PBS), 6:00 P.M. EST, 20 April 2000. Mr. Kevin Bacon, US assistant secretary of defense for public affairs, said, "The Kosovo conflict was an air war; it was very difficult to cover for that reason; there were no front lines in the traditional sense." See also "Postwar Review Found Fewer Serb Weapons Hit in Kosovo," *Washington Post*, 9 May 2000, 17. Bacon said, "We obviously hit enough tanks and other targets to win."

2. "Clark Recalls 'Lessons' of Kosovo," *International Herald Tribune*, 3 May 2000, 1. See also John A. Tirpak, "The NATO Way of War," *Air Force Magazine* 82, no. 12 (December 1999).

3. See Robert B. Cialdini, *Influence: The Psychology of Persuasion* (New York: William Morrow and Company, Inc., 1993); Edward S. Herman and Noam Chomsky, *Manufacturing Consent: The Political Economy of the Mass Media* (New York: Pantheon Books, 1988); Richard Brodie, *Virus of the Mind: The New Science of the Meme* (Seattle: Integral Press, 1996); and Roger Fisher and William Ury, *Going to Yes: Negotiating Agreement without Giving In* (New York: Penguin Books, 1991).

4. "U.S. Military Debates Link between Kosovo Air War, Stated Objectives," *Inside the Pentagon*, 20 April 2000, 1.

5. If this were the case, then clearly some theories worked better than others in practice. See "Chinese Embassy Bombing: A Wide Net of Blame," *New York Times*, 17 April 2000, 1:

> As with most attacks during the war, especially the strikes in Belgrade, planning and execution were done by Americans. In raids involving the stealthy B-2's and F-117 fighters, many details about the attacks were classified as "U.S. only," mainly for fear of revealing secrets about those aircrafts. After the war, some allies questioned the practice. The French Ministry of Defense's report on the war last November complained of military operations "conducted by the United States outside the strict NATO framework and procedures."
>
> A senior NATO diplomat said the United States identified 75 to 80 targets in this way. The Chinese Embassy was one of them.

6. For a theory of conflict termination applied to states and consistent with these views, see Joseph A. Engelbrecht Jr., "War Termination: Why Does a State Decide to Stop Fighting?" (PhD diss., Columbia University, 1992).

7. Craig W. Kirkwood, *Strategic Decision Making: Multiobjective Decision Analysis with Spreadsheets* (Boston: Duxbury Press, 1997). In the decision analysis discipline, utility is a function of risk preference for the levels of a measurable attribute. Decision makers for a decision have one of three risk preferences: they are risk neutral, risk seeking, or risk averse regarding the decision to be made. The preferences for levels of a measurable attribute (tanks, CEP, casualties, or something similar) are assessed using lotteries (i.e., questions involving the uncertainties or probabilities). For example, how many tanks destroyed for certain are equivalent to a 50-50 chance of destroying one hundred or zero tanks? If the number is expected value (50), the decision maker is risk neutral. If the number is less than the expected value, the decision maker is risk averse. If the number is greater than the expected value, the decision maker is risk seeking. Value, on the other hand, measures the returns to scale of each increment of an attribute. Value assumes certainty. If the attribute has constant returns to scale, the value function is linear. If the attribute has diminishing returns to scale, the value function is concave. If the attribute has increasing returns to scale, the value function is convex.

8. Risieri Frondizi, *What Is Value?* trans. Solomon Lipp (LaSalle, Ill.: Open Court, 1963), 6–7.

9. "DOD Leaders to Approve Revised Long-Term Vision," *Jane's Defence Weekly*, 10 May 2000.

> For example, Joint Vision 2020 will re-emphasise the requirement for "full spectrum dominance," ranging from major force-on-force engagements to small-scale contingencies, humanitarian operations and the variety of other crises short of war for which US forces are in high demand. Although this has been a mantra of the Department of Defense (DOD) for some time, "we felt as though that was one thing that got lost" in Joint Vision 2010, which focused primarily on the high end of operations, according to a senior military official who briefed *Jane's Defence Weekly* on the new document.

10. The same is true today: the way we make war is the way we make wealth. See Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (New York: Warner Books, 1993), 3.

11. Ibid.

12. Carl H. Builder, "Peering into the Future: Trying to Get the Enterprise Right," lecture, the National Reconnaissance Office, 11 March 1997. Builder's untimely death was a great loss to the US Air Force and to airpower thinking everywhere.

13. One need only scan Frederick, Jomini, Clausewitz, Moltke, Schliefen, and Schlichting to recognize that the machinery of warfare extended to the mechanical way in which massed armies were formed, trained, and employed. Even today, for example, the motto of the German *Fuhrüngsakadamie der Bundeswehr* is "The mind moves the mass." See Daniel J. Hughes, ed., *Moltke on the Art of War*, trans. Daniel J. Hughes and Harry Bell (Novato, Calif., Presidio Press, 1993).

14. R. J. Overy, *The Air War: 1939–1945* (New York: Stein and Day, 1980), 267.

15. We forgot that the Red Army broke the back of the German army by destroying 150 divisions with only modest support from the Allies. See John Ellis, *Brute Force: Allied Strategy and Tactics in the Second World War* (New York: Viking Penguin, 1990); Overy, *The Air War*; and Graham Lyons, ed., *The Russian Version of the Second World War: The History of the War as Taught to Soviet Schoolchildren* (New York: Facts on File, Inc., 1976).

16. Ellis, *Brute Force*, xviii. Ellis records that

> in the last 18 months of the war the Allies put onto the battlefield 80,000 tanks to the Germans' 20,000; 1,100,000 trucks and lorries to 70,000; and 235,000 combat aircraft to 45,000. In these same months the U-boats sank 630,000 tons of merchant shipping whilst the Allied shipyards turned out another 20,000,000 tons; between 1942 and 1945 the Japanese built 13 aircraft carriers, the crucial component of modern naval warfare, but the Americans built 137. The Battle of Production was a walkover.

17. John A. Warden III, "Air Theory for the Twenty-first Century," in Barry R. Schneider and Lawrence E. Grinter, eds., *Battlefield of the Future: 21st Century Issues* (Maxwell AFB, Ala.: Air University Press, 1997), 103–24.

18. Joseph A. Engelbrecht Jr. observes that

> unfortunately, the targets get hit over and over again because of the weakness of execution and more importantly because his [Warden's] analysis only occurs at the beginning of the campaign when total system functionality is decomposed and targeted. He is not expecting a calculus but a collapse.

19. Warden, 111.

20. Will and Ariel Durant, *The Lessons of History* (New York: Simon and Schuster, 1968), 19.

21. See the "official" Hezbollah Web site at http://www.hezbollah.org/index.html.

22. Abraham H. Maslow, "A Theory of Human Motivation," *Psychological Review* 50 (1943): 370–96; and idem., *Motivation and Personality* (New York: Harper and Row, 1954).

23. David Ronfeldt, "Beware the Hubris-Nemesis Complex: A Concept for Leadership Analysis," RAND Report MR-461 (Santa Monica, Calif.: RAND, 1994), 31.

24. Brodie, 193–95. Similar to Maslow, Brodie identifies "push-button memes, the ones that are fit because they take advantage of our basic human nature": security, crisis, food, sex, problem, dominance, and belonging. These memes can be the basis for a category of engagement or attack that threatens leaders' abilities to satisfy needs.

| | Target | Outcome |
|---|---|---|
| **Security** | Command centers and residences | Deny feeling of well-being |
| **Crisis** | Urgent, surprise problems | Overload, loss of self-esteem |
| **Food** | Imports, delicacies, favorites | Deprivation of esteem |
| **Sex** | Partners | Loneliness |
| **Problem** | Complex, multidimensional | Overload |
| **Dominance** | Successor or allies | Deny feeling of safety |
| **Belonging** | Successor or allies | Deny comfort of affiliation |

25. Gregory S. Parnell notes that utility targeting has "a strong time component." Many of the targets relate to "future capability. The opponent then has the opportunity to find alternative future capacity." We agree. We believe that value targeting, in threatening to deprive the leaders of present needs, will more quickly lead to a cessation of fighting.

26. William M. Arkin, "Infamous Anniversary," *Washington Post*, Monday, 8 May 2000, n.p.; on-line, Internet, available from http://www. washingtonpost.com. Arkin writes:

> About one month into the air war, U.S. and British planners began to put together what they called the "3M" strategy, for money MUP (Ministry of Interior), and media. Covert operations were already underway in Cyprus, Italy and Belarus to go after the financial resources of Slobodan Milosevic, his family and "cronies." Now, a combination of psychological warfare, computer attacks and bombing would join in a super-secret effort to increase the pressure on Milosevic. The crony targeting plan was born.

27. Richard Szafranski, "Toward a Theory of Neocortical Warfare: Pursuing the Acme of Skill," *Military Review*, November 1994; and idem, "When Waves Collide: Conflict in the Next Century," *JFQ: Joint Force Quarterly*, Winter 1994–1995.

28. It may work least well against adversaries who do not share our values.

29. Col Charles J. Dunlap Jr., USAF, "The End of Innocence: Rethinking Noncombatancy in the Post Kosovo Era," 6. In this article, scheduled for publication in a forthcoming issue of *Strategic Review*, Dunlap argues for the need for a "new paradigm" in targeting:

> What kind of civilian objects would be added to target lists? None that are genuinely indispensable to the survival of the noncombatant population. Not struck, for example, would be many of the infrastructure targets suggested in the *Airman* magazine article. However, almost everything else of any value would be fair game. The new target sets would include such things as banks and financial institutions. Factories, plants, stores, and shops that produce, sell, or distribute luxury products or, indeed, anything not absolutely indispensable to noncombatant survival, might be wonderfully rewarding targets—as could be their associated logistics systems. Reducing the middle and upper classes to a subsistence level through the destruction of access to all but essential goods might pressure the very groups best positioned to effect the desired change.
>
> Additional targets under this proposal could include selected cultural, educational, and historical sites whose existence provides support—to include psychological sustenance—to the malignant ideology that stimulates the behavior the use of force is intended to stop. Furthermore, resorts, along with other entertainment, sports, and recreational facilities could be slated for destruction. Of course, government offices and buildings of every kind would be subject to eradication, even if they do not directly support military activities (except those whose destruction would seriously impede the delivery of

services indispensable for noncombatant survival). Finally, to the extent it is feasible to do so, the personal property of the sentient, adult population ought to be held at risk so long as it is not, again, indispensable to human survival. Milosevic's bank accounts would be high on the target list under the revised model.

30. Paul Watzlawick, John Weakland, and Richard Fisch, *Change: Principles of Problem Formation and Problem Resolution* (New York: W. W. Norton and Company, 1974); and Paul Watzlawick, *How Real Is Real? Confusion Disinformation Communication* (New York: Vintage Books Edition, 1977).

31. For press reporting on alleged information operations during Operation Allied Force, see Lisa Hoffman, "U.S. Opened Cyber-War during Kosovo Fight," *Washington Times*, 24 October 1999, C1; and William M. Arkin, "The Cyber Bomb in Yugoslavia," 25 October 1999; on-line, Internet, available from http://www.washingtonpost.com. For a judgment on the legality of information operations, see Department of Defense, Office of General Counsel, "An Assessment of International Legal Issues in Information Operations," May 1999.

32. We appreciate that if one will not concede that airpower, which to us includes information operations—exercised through the air, space, and cyberspace—does not have a pivotal role in targeting and engaging the things that make it possible for adversary leaders to meet their needs, then one cannot accept that axiological operations are necessarily "aerospace" operations.

33. Dunlap, "The End of Innocence."

34. This scenario was described to one of us by a senior government official to illustrate the strength of our values and the weaknesses those values may cause in some instances.

35. "Barr Calls for End to Assassination Ban: Says Terrorist Leaders Should Be Eliminated," 25 August 1998, n.p.: on-line, Internet, available from http://www.house.gov/barr/p_ban.html, "U.S. Representative Bob Barr (GA-7) called for an end to the ban on assassinating foreign leaders who murder U.S. citizens and sponsor terrorism."

36. Future $C^2$ or $C^4I$ attacks, for example, have to consider the utility of copper, coaxial cable, fiber, wireless, narrow-band from space, wideband from space, radio, semaphore, smoke, drums, and couriers. Some of these things may be sanctuaried as "noncombatant," "civilian," or "nonbelligerent" state entities.

37. Value targeting is what our adversaries are likely to do against us. It represents a focus of asymmetric operations. The asymmetries are not so much in the military operations as they are in capitalizing on the asymmetries in values. See United States Commission on National Security/21st Century, *New World Coming: American Security in the 21st Century: Major Themes and Implications* (Washington, D.C.: Government Printing Office, 1999), 8.

38. The home of an eclectic and by all accounts idiosyncratic group of code breakers in World War II Britain.

39. The following excerpt is taken from "The Lies Of War: NATO's Balkan Bombing Tally," *Colorado Springs Gazette*, 2 June 2000:

> The actual numbers, as reported by a Munitions Effectiveness Team (MEAT) sent to inspect bombing sites in helicopters and on foot: 14 tanks, not 120; 17 armored personnel carriers, not 220; 20 artillery pieces, not 450, according to *Newsweek*. Out of 744 "confirmed" strikes by NATO pilots, the Air Force investigators, who spent weeks combing Kosovo by helicopter and by foot, found evidence of just 58. Yugoslav forces turned out to have been rather skillful at "spoofing" bomber pilots. "The Serbs protected one bridge," Barry and Thomas wrote, "from the high-flying NATO bombers by constructing, 300 yards upstream, a fake bridge made of polyethylene sheeting stretched over the river. NATO "destroyed" the phony bridge many times. Artillery pieces were faked out of long black logs stuck on old truck wheels. A two-thirds scale SA-9 antiaircraft missile launcher was fabricated from the metal-lined paper used to make European milk cartons."
>
> The exaggeration about destruction of military targets provides a bookend to exaggerations that set the stage for the war. Before the bombing began, U.S. and NATO spokesmen insisted that "cleansing" of Kosovo Albanians was occurring on a massive scale. Estimates of 10,000 or more civilians murdered by Serb-dominated Yugoslav forces were bandied about to justify starting the bombers on their way. After the war, NATO investigators uncovered evidence of about 3,000 Kosovars killed, with a significant amount of the slaughter occurring after the bombing had begun. By comparison, between 3,000 and 5,000 Serbs and Albanians, most of them civilians, were killed by NATO bombing attacks.

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*Two fundamental lessons of war experience are—never to check momentum; never to resume mere pushing.*

—B. H. Liddell Hart, 1944

# Ira C. Eaker Award Winners

## for the 1999–2000 Academic Year

### First Place

**Maj Jon Huss, USAF**
"Exploiting the Psychological Effects of Airpower: A Guide for the Operational Commander"
(Winter 1999)

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"The Guardians of Space: Organizing America's Space Assets for the Twenty-First Century"
(Spring 2000)

**Lt Col Howard D. Belote, USAF**
"Warden and the Air Corps Tactical School: What Goes Around Comes Around"
(Fall 1999)

### Runners-Up (continued)

**Maj David M. Tobin, USAF**
"Man's Place in Space-Plane Flight Operations: Cockpit, Cargo Bay, or Control Room?"
(Fall 1999)

### Honorable Mention

**Lt Col Dik Daso, USAF**
"*New World Vistas:* Looking toward the Future, Learning from the Past"
(Winter 1999)

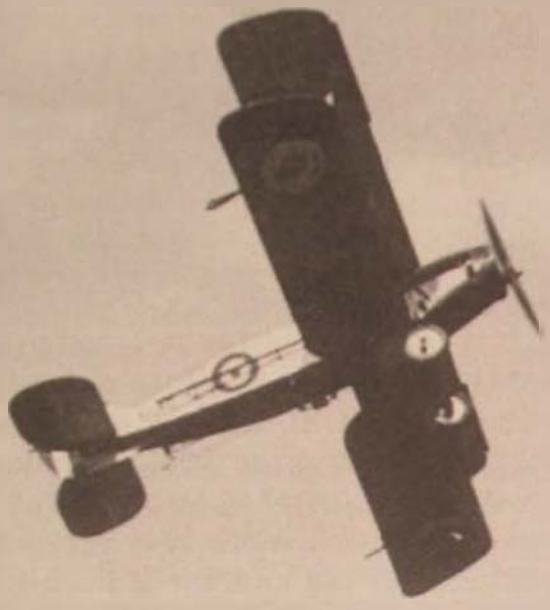
**Lt Col Howard D. Belote, USAF**
"The Weaponization of Space: It Doesn't Happen in a Vacuum"
(Spring 2000)

Congratulations to all of this year's winners! The award honors airpower pioneer Gen Ira C. Eaker and is made possible through the sponsorship of the Arthur G. B. Metcalf Foundation. If you would like to compete for the Ira C. Eaker Award, submit a feature-length article to the Editor, *Aerospace Power Journal*, 401 Chennault Circle, Maxwell AFB AL 36112-6428 or via E-mail at apj@maxwell.af.mil. All US military personnel below the rank of colonel (O-6) or US government civilian employees below GS-15 or equivalent are eligible.

# The Myth of Air Control

## Reassessing the History

Dr. James S. Corum



*Editorial Abstract: Dr. Corum provides a historical look at air-control operations in the British Empire during the first half of the twentieth century. The idea of occupying and pacifying a country with air-power alone has always appealed to airmen. The author, however, argues that advocating air-control doctrine as the basis for US Air Force operations in the twenty-first century lies more in the realm of myth than reality.*

IN THE AFTERMATH of World War I, a financially strapped Britain had to face up to several expensive, new colonial obligations in the form of League of Nations mandates to govern Palestine, Transjordan, and Iraq. At the same time that the armed forces received orders to assume a costly burden of military occupation in regions rife with violent internal conflicts, the government moved to demobilize the wartime forces and to economize by any means possible. This meant that the British had to police new imperial obligations on the cheap.

At the same time, the Royal Air Force (RAF), which had recently become a separate service in April 1918, was fighting for its institutional existence. Both the army and navy argued that the RAF ought to revert to its position as a subordinate arm of the two senior services. Air Marshal Hugh Trenchard, RAF chief of staff, sought a mission that would justify the service independence of the RAF. The effectiveness of a few aircraft in putting down a minor rebellion in British Somaliland in 1919–20 provided Trenchard and the Air Staff the concept of an independent mission for the RAF. Trenchard proposed that the RAF be given full responsibility for conducting military operations in Britain's most troublesome new mandate—the former Ottoman provinces of Mesopotamia.[1]



*Early RAF statements on air control stressed its effectiveness and lethality.*

Trenchard promised that the RAF could police the mandate with air squadrons and a few armored-car squadrons, supported by a few British and locally recruited troops, at a fraction of the cost of a large army garrison. That particular argument proved irresistible to Whitehall, so in October 1922, RAF air marshal John Salmond took over military command and assumed military responsibility for Iraq. The RAF's primary garrison for Iraq consisted initially of eight squadrons of fighters and light bombers, such as DH-9s. As the RAF's account goes, the air-control doctrine worked remarkably well. All through the 1920s and 1930s, the RAF was able to quell minor rebellions and tribal banditry by swiftly punishing the culprits from the air. Bombing and the threat of bombing seemed to keep Iraq relatively quiet. Policing the empire by means of airpower became popular in other colonies as well. RAF bombing raids largely replaced the army's traditional punitive expeditions mounted against troublesome tribes on India's Northwest Frontier. In Aden, the British also used air attack on numerous occasions to deal swiftly with trouble in the interior.

The idea of occupying and pacifying a country by airpower alone, or with the air force as the primary force employed, is especially attractive to airmen. Indeed, in the 15 years that the United States has found itself involved in various peacekeeping and peace-enforcement operations, as well as no-fly-zone enforcement and a variety of small and conventional wars, Air Force officers and airpower theorists have looked at the RAF's colonial air control as a useful model for the kind of military-occupation missions that the United States conducts today.[2] Further, the idea of controlling a country by airpower, with few or no ground troops involved, has excited the interest of such influential airpower theorists as Carl Builder.[3] The low cost of air control is an especially attractive feature of the operation. Another is the fact that aerial policing does not put US soldiers at risk. It is a good doctrine for casualty avoidance.

However, if one offers air control on the imperial British model as a model for the US Air Force, then one should look carefully at the actual record of air control in the British Empire. The following questions are in order: Did the RAF overstate its role and minimize the actions of ground troops in order to defend its budget? Did air control really work as well as advertised? What were the drawbacks to air control? What was the political context of air control, and is there an analogy to today's political situations? Did other countries use air control, and, if so, what was their

experience? After reviewing the record, I will draw a few lessons of my own.

## The Genesis of Air Control

The British first employed the concept of air control in the wastes of Somaliland, one of the most primitive backwaters of the empire. Since the 1890s, Mohammed bin Abdullah Hassan, a charismatic tribal leader known as "the Mad Mullah," had caused trouble in the British protectorate by raiding tribes friendly to the British. From 1900 to 1904, the British mounted several punitive expeditions against him and took fairly heavy losses. In 1904 they finally brought the Mad Mullah's main force to battle, defeated it, and drove him out of British territory. However, the trouble did not end. In 1909 Abdullah Hassan started raiding again, and in 1913 his forces shot up a unit of British constabulary. During World War I, the British ignored the problems in Somaliland, but after the war, the British government decided to reinforce the protectorate with an RAF squadron of DH-9 reconnaissance/light-bomber aircraft. Eight aircraft had arrived by January 1920, and the British set to work with surprise bombing raids on Abdullah Hassan's forts. Several days of bombing inflicted heavy casualties, forcing the Mad Mullah to abandon his forts. The army field force—consisting of detachments from the King's African Rifles, Somaliland Camel Corps, and Indian army—moved in pursuit of the mullah's force. Over the next weeks, the RAF reverted to supporting the ground force by reconnaissance and bombing. The mullah escaped and took his remaining forces over the border into Ethiopia, where he died the next year.[4] For the astoundingly low price of 80,000 pounds, airpower had played a central role in defeating a force that had irritated the colony for many years.

The RAF, fighting for its institutional survival, made much of this use of airpower in colonial policing, not stressing the fact that it flew most of the sorties in support of the ground forces. Indeed, the most important part of the outcome was the low cost of the affair. After the successful operation in Somaliland, in March 1921 at the Cairo Conference on Mideast Affairs, chaired by Colonial Secretary Winston Churchill, Air Marshal Trenchard formally proposed that the RAF take over the task of directing military operations in Iraq and that the primary British force employed in that troublesome country be RAF squadrons.[5]

***The RAF reverted to supporting the ground force by reconnaissance and bombing.***

Somaliland had been a very small operation, but the problems in Iraq were enormous, and the military situation looked grim for the British. Their army had seen heavy fighting in Iraq throughout World War I. British expeditionary forces, mostly from the Indian army, fought for four years trying to push the Turks out of the region. Iraq was the scene of one of Britain's greatest defeats in the war when the Turks cut off a British army of nine thousand men and forced them to surrender at Kut in April 1916. The British reinforced their army, counterattacked, and in 1917 took Baghdad.[6] By the end of the war, they had pushed the Turks to Mosul and had occupied most of the country. At the end, the British had 420,000 men in Iraq.[7]

After the war, the British Foreign Office and Colonial Office had little idea of what to do with Iraq. It was a poor and backward part of the Ottoman Empire, and the British had no major strategic interest in the area (the extent of the oil reserves remained unknown). However, various wartime deals had allocated responsibility for Mesopotamia, Jordan, Arabia, and Palestine to Britain and had given France the responsibility for Lebanon and Syria. During the war, the British placed occupied portions of Iraq under military rule and brought in Indian civil service political officers to administer the territory. This

arrangement persisted after the end of the war.

If the British government had deliberately and carefully crafted a grand strategic plan to alienate the three major groups in Iraq (Kurds, Shiite Arabs, and Sunni Arabs) and force the whole country into a massive rebellion against their British occupiers, it could not have succeeded more handily. The Indian political officers tried to impose a very alien Indian-style administration upon the Arabs and Kurds. Under the Turks, the administration might have been inefficient, but at least the Turks spoke Arabic and left the tribes largely alone.[8] On top of this new and irritating administration, the British and French governments had issued a declaration on 7 November 1918, promising the Arabs freedom and self-government after the war.[9] They had given hopes for self-government not only to the Arabs but also the Kurds.[10] Such promises were quickly forgotten as the British moved to create an Iraqi monarchy and put a Sunni Arab on the throne. The fact that the British consulted none of the major groups in Iraq especially offended the Kurds and Shiites, the majority of the population.[11] By 1920 Iraq was ready to blow up—and did. The rebellion began in Kurdistan and quickly spread throughout the country.

The 60,200 British troops in the country when the rebellion began were hard-pressed simply to hold on. Small British garrisons in the hinterlands were surrounded and wiped out. The Kurd and Arab rebels were not the primitive and poorly armed tribesmen that the British had faced in Somaliland. When the Turkish Empire had collapsed, large stocks of modern arms and ammunition throughout Syria and Mesopotamia fell into the hands of local tribesmen, equipping the rebels with modern rifles and machine guns.[12] Many of the leaders of the revolt had served in the Ottoman and Arab armies during the war and had a pretty good understanding of modern warfare. They were not likely to be overawed by British aircraft and technology.[13]

The hard-pressed British garrison called for army and air force reinforcements. Nineteen battalions (4,883 British and 24,508 Indian army troops) as well as two additional RAF squadrons were dispatched to Iraq to reinforce the two squadrons already in the country.[14] By August the British were able to mount a successful counteroffensive that stamped out the rebellion by the end of the year. The RAF squadrons performed sterling service in evacuating British personnel, dropping supplies on besieged outposts, and performing constant reconnaissance and bombing missions in support of the ground forces. The Iraqi rebellion of 1920 amounted to a fairly large conventional war, and some major pitched battles occurred between the rebels and British forces. At Rumaitha on 13 October, a three-thousand-man rebel force dug in and stood up to a daylong attack by a British brigade. Starting at 0800, the British pummeled the Iraqis with artillery, and RAF aircraft relentlessly bombed the defenders. Finally, under the weight of a full-brigade attack, the rebels broke and retreated in disorder at 1700.[15] The British suppressed the rebellion but at a cost of 1,040 killed and missing soldiers and 1,228 wounded—not to mention an estimated 8,450 dead Iraqi rebels.[16] The financial cost of the enterprise also shocked the British government. In order to maintain control of a minor colonial mandate with little strategic value, British military operations had cost the treasury 40 million pounds, considerably more than Britain had spent in supporting the Arab revolt against the Turks in World War I.

Iraq proved such a drain of manpower and resources that when the RAF offered to garrison the country at minimal cost, the British government welcomed the idea. On 1 October 1922, the RAF assumed control of military forces in Iraq, marking the first time that an airman directed all military operations in a country.[17] The British government could then announce that it had pulled all army forces out of Iraq at great savings to the taxpayer. Henceforth, the military garrison in Iraq would consist of eight RAF squadrons and

four RAF armored-car companies.[18] The British recruited five thousand of the 15,000 local Iraqi levies and police and organized them as the core of an Iraqi army. These local forces would be British equipped, officered, and trained but supported by revenues of the Iraqi state.[19]

The government's announcement that it had withdrawn all *British* forces from Iraq was technically correct. However, it made little mention of the fact that Indian army brigades and supporting troops had replaced them. Since the Indian State military budget rather than the British War Department budget paid for the Indian army troops, British taxpayers and politicians got a pretty good deal—the only player unhappy with the arrangement was the government of India.[20] Although Iraq became an example of a country garrisoned by airpower, a significant army force remained on hand throughout the entire period of the British mandate until Iraq received full independence in 1932. By 1926 the British had created the framework of an Iraqi army, which boasted a military college, training center, and cavalry school—and the regular army had grown to a force of six infantry battalions, four cavalry regiments, four artillery batteries, and various supporting units.[21] The British also maintained at least a brigade of Indian army troops in the country until the 1930s.

## Air-Control Policy

The British Empire had long relied upon punitive expeditions to bring rebellious natives back into line. When a border tribe on India's Northwest Frontier violated a treaty or when a band in Aden took a British official hostage, the standard response called for putting together a military expedition, marching on the tribal center, burning some villages, destroying crops, and killing any tribesmen who offered resistance. Then the army column would return to the garrison, knowing that the natives had been taught a lesson and would not likely defy British power again. The lesson and deterrent effect would last for a



*The RAF emphasized the humanitarian nature of its air-control system.*

short time—sometimes months, sometimes years—and then the tribesmen would commit another outrage, necessitating another British expedition to punish them.[22] Punitive expeditions ranged in size from a platoon of the Camel Corps riding against one village to months-long operations mounted on the Northwest Frontier by thousands of soldiers. A comprehensive list of punitive expeditions mounted by Britain at the height of the empire—between 1840 and 1940, from Burma to India to the Sudan—would certainly number in the hundreds, probably in the thousands. In short, such expeditions were brutal but indispensable means of keeping the empire under control.

To put it simply, air control meant substituting aerial bombardment for the traditional ground-based punitive expedition. Airplanes could reach the object of the expedition (e.g., the tribal headquarters or main village) very quickly. Airplanes had an impressive amount of firepower and the capability to inflict serious harm upon rebellious natives. Since disruption and destruction were the goal of a punitive expedition, a small force of airplanes proved cheaper and more efficient since it could inflict as much damage as a large and cumbersome ground-force expedition.

The early RAF statements on air control stress its effectiveness and lethality. In the spirit of the empire, everyone acknowledged that strong and forceful action was the best means of keeping natives under control. As

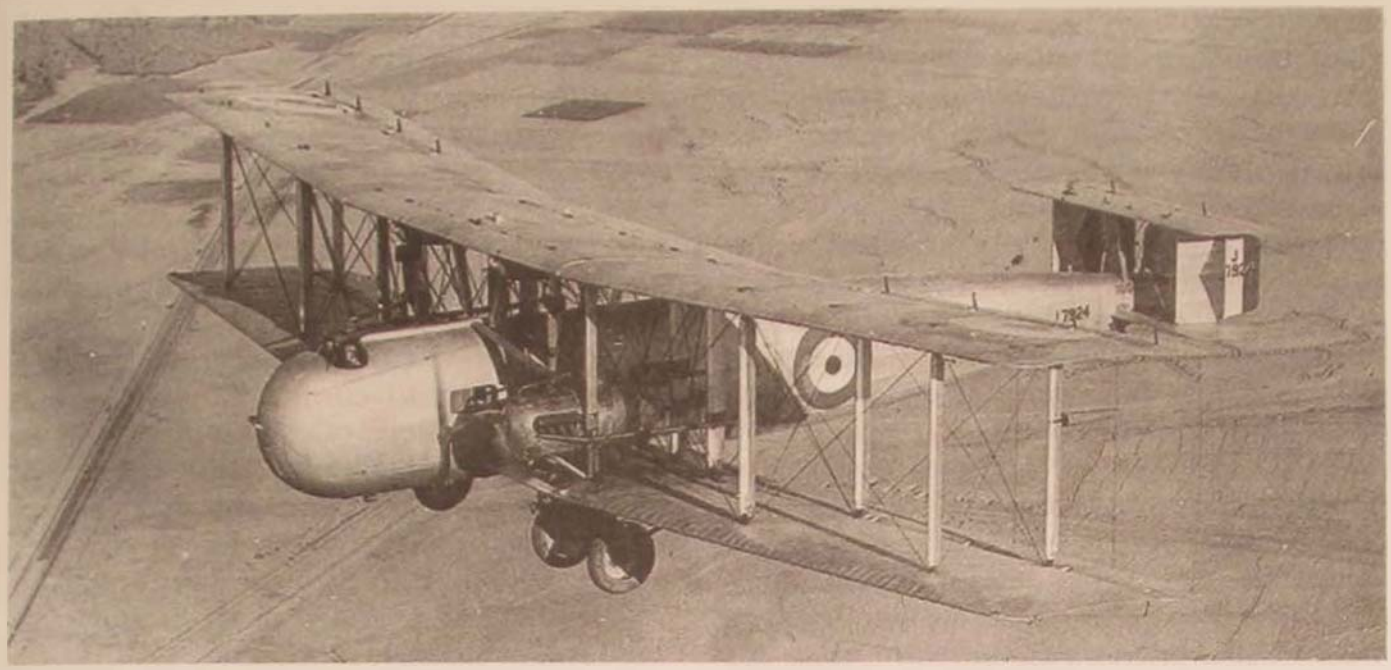
pointed out by RAF wing commander J. A. Chamier in 1921,

> To establish a tradition, therefore, which will prove effective, if only a threat of what is to follow afterwards is displayed, the Air Force must, if called upon to administer punishment, do it with all its might and in the proper manner. One objective must be selected—preferably the most inaccessible village of the most prominent tribe which it is desired to punish. All available aircraft must be collected. . . . The attack with bombs and machine guns must be relentless and unremitting and carried on continuously by day and night, on houses, inhabitants, crops and cattle. . . . This sounds brutal, I know, but it must be made brutal to start with. The threat alone in the future will prove efficacious if the lesson is once properly learnt.[23]

The draft of the RAF's *Notes on the Method of Employment of the Air Arm in Iraq* proudly pointed out that "within 45 minutes a full-sized village . . . can be practically wiped out and a third of its inhabitants killed or injured by four or five planes which offer them no real target and no opportunity for glory or avarice."[24] Although such tactics expressed the common military view on how the empire needed to be policed against the rebellious tribes and bandits that threatened good order, such policies came under increasing attack in parliament during the 1920s. The RAF had to defend itself against the charge of inhumane warfare when a Labour government came to power in 1924. That year, Colonial Secretary James Thomas wrote to the high commissioner in Iraq and complained that critical press stories had appeared about bombing rebellious tribesmen and that heavy casualties "will not be easily explained or defended in Parliament by me."[25] In order to make air control more palatable to the politicians, later drafts of the RAF's notes on air control stressed its humanitarian aspects. Rebellious villages would first receive a warning that they would be bombed if they did not accede to government demands. After allowing a reasonable time for evacuation, aircraft would demolish the houses with bombs—not with the intention of destroying the village but with the aim of disrupting daily life.[26]

The War Ministry, which resisted the idea of the RAF's controlling military operations in any colony, also chimed in about the inhumanity of bombing women and children.[27] The argument, however, falls flat when one considers that army punitive expeditions routinely burned the crops and food stores of rebellious tribes and fired artillery into villages.[28] In fact, most of the army officers in the colonies heartily approved of immediate and forceful action by the RAF as a means of keeping incipient native rebellions in check. After the massacre of 1919, when army troops under Gen Reginald Dyer killed four hundred unarmed civilians at a protest meeting at Amritsar, India, the armed forces policing the empire were directed to operate under the doctrine of "minimum necessary force." The RAF learned to report the casualties of air control in vague terms, and enthusiastic supporters of the policy, such as Basil Liddell Hart, argued that prompt action by the air force at the first sign of trouble had calmed "tribal insubordination . . . before it could grow dangerous and there has been an immense saving of blood and treasure to the British and Iraqi governments."[29]

Although the RAF officially acknowledged the humanitarian policy of minimum necessary force and the proponents of air control could point out that the RAF stayed its hand on occasion to avoid inflicting casualties on women and children, one suspects that in the far reaches of the empire—out of the reach of nosey correspondents and acting against people without any direct communication to the British government or League of Nations—humanitarian sentiments gave way to the practical mission of running an empire. In his book *Imperial Policing* (1936), Maj Gen Sir Charles Gwynn probably expressed the views of the average British officer concerning the minimum-necessary-force policy: "The far-reaching effects of General Dyer's action at Amritsar should be noted by soldiers. The government of India appears to have allowed itself to be drawn into the com-





*When rebels were cornered, the RAF provided heavy firepower in the form of close air support.*

mon error of altering well-recognized and tested procedure in consequence of one exceptional incident."[30] An RAF flight commander based in India's Northwest Frontier in the 1930s recalled the fairly constant action against tribes in that part of the empire: "If they went on being troublesome, we would warn them that we would bomb an assembly of people. An assembly was normally defined as ten people. . . . Indeed, in my case I can remember actually finding nine people and saying 'That's within ten per cent and that's good enough,' so I blew them up."[31]

## The Reality of Air Control

From the start, the British used air control quite enthusiastically in Iraq as a basic means of keeping the population in line. The RAF found that a few airplanes, without support from the other arms, could deal with myriad police problems common to a violent, tribal society. Tribes that persisted in raiding caravans found themselves under air attack, which soon coerced them into changing their ways. The British also widely applied air-control methods in other colonies, including Aden, Sudan, Transjordan, and India's Northwest Frontier. Indeed, the Northwest Frontier Province, home to numerous warrior tribes with a long history of hostility against British India, saw more instances of air-control operations than did Iraq in the period between the World Wars. A typical operation occurred in March 1921, when a band of one hundred Mahsud raiders stole 50 camels. Later, the same band got in a firefight with an Indian army detachment, wounded a British officer, and inflicted 36 casualties on the Indian troops. The RAF responded with a series of raids and dropped 154 bombs on the Mahsud capital. The area soon quieted down.[32]

Aden was the scene of numerous air-control operations. A typical example of the coercive power of air attack, or the threat of attack, dealt with deterring Yemeni rustlers. In July and September 1933, Yemeni tribesmen raided the territory of the Aden Protectorate and made off with livestock from a tribe under British rule. Moreover, the Yemenis took some hostages from the tribe and held them for ransom—fairly typical behavior for the tribes in that part of the world. The small British garrison at Aden got word of the inci-

dent and promptly threatened the Yemenis with a bombing raid unless they returned the livestock, along with all the remaining hostages and ransom money. They took the British threat seriously and promptly returned the looted property.[33]

In Iraq the British used air-control tactics as a means of enforcing revenue collection. At the outset of the air-control program, the RAF in several instances bombed tribes that refused to pay their taxes. The Colonial Office in London considered this policy a bit heavy-handed, but the high commissioner in Iraq insisted it was necessary since he considered the nonpayment of taxes defiance of the British regime. Although not widely publicized, the bombing of tax evaders continued.[34] Once tribes got the word that the British were *really* serious about paying taxes, fiscal cooperation seems to have become the order of the day, and tax compliance in Iraq reached a satisfactory level.

Although one gets the impression from RAF reports to London and articles written by sympathizers such as Liddell Hart that RAF operations in the colonies consisted primarily of airpower policing operations, the reality was quite different. Most of these operations in the interwar years both supported and cooperated with ground troops. Although an RAF officer was in command in Iraq, the British needed significant ground forces to keep order. Any banditry or rebellion on a larger scale than the minor instances noted above required a force of ground troops to engage the enemy. As already noted, sizeable Iraqi and Indian army forces were available to deal with serious rebellions, and from 1922 to Iraqi independence in 1932, they saw considerable fighting.

In 1920 Sheik Mahmud, a tribal leader with his capital at Suliamania, was one of the first Kurdish nationalist leaders to rebel against the British. The latter forced Mahmud into exile after the rebellion but allowed him to return in 1923 with the agreement that he would support British rule of Kurdistan and oppose Turkish attempts to encroach on the province. However, Mahmud began to negotiate secretly with the Turks, and open conflict began between the British and the Kurdish tribes supporting Mahmud. For three years, Mahmud carried on a guerrilla campaign against the British and the Iraqi government.[35] The RAF bombed Suliamania for several months without noticeable effect on the morale of Mahmud and his supporters. In the operations against Mahmud, the air force cooperated with army and police columns trying to corner the rebels. The army columns were often mounted and as light as possible. The primary role of the RAF in such operations was reconnaissance, and in this role the aircraft proved fairly effective. When British/Iraqi troops cornered the rebels, the RAF provided heavy firepower in the form of close air support.

One army officer who participated in the campaign against Mahmud noted that the British had overestimated the effect of airpower against tough guerrillas like Mahmud's Kurds. First of all, the air force appeared to have consistently exaggerated its claims of casualties inflicted by air attack.[36] Furthermore, aerial reconnaissance often failed to spot rebel forces since they had cleverly learned to camouflage their camps and positions and to move by night.[37] The British tried to supply ground columns by aircraft during the campaign, but that effort proved unsuccessful.[38] Only after a three-year combined air and ground campaign did British forces finally force Mahmud into exile in Iran.

In September 1930, an election in Kurdistan turned into an antigovernment riot, and antigovernment protests soon turned into a demand for a united Kurdistan. In October, Mahmud returned from exile and mounted a guerrilla campaign against the British.[39] From October 1930 to May 1931, the Iraqi army put two mounted columns in the field against him. In this campaign, the RAF was relegated to an army-support role, providing reconnaissance and attacking Mahmud's forces only after army units had found and fixed them. In this campaign, the British prohibited the bombing of villages since such action would likely generate support for Mahmud.[40] For a

campaign against another Kurdish rebel leader, Sheik Ahmed of Barzan, carried out between December 1931 and June 1932, the British assembled a ground force of three battalions, a machine-gun company, an artillery battery, and two hundred police. The RAF supported the ground troops in several battles and conducted an extensive bombing campaign against Sheik Ahmed's territory, all of which forced Ahmed into exile in Turkey.[41]

## Foreign Air-Control Operations

The other major colonial powers—Spain, Italy, and France—all used their air forces extensively to help police their colonies and to help their armies suppress rebellions. In most respects, the experience of the French in using airpower closely paralleled British doctrine and experience.

When the French occupied their Mideast colonies of Lebanon and Syria in 1919, they faced the same sort of nationalist unrest that the British faced in Iraq. Initially, the French sent a larger air contingent to garrison Syria than the British sent to Iraq and by the end of 1919 had built up a force of four squadrons in Syria. French Breguet 14 light bombers, sturdy aircraft from the Great War, played the same role that the RAF's DH-9s played in British colonial operations. Gen Maxime Weygand, commander of the garrison in Syria, argued that airpower was "indispensable" and requested more air squadrons so that he could withdraw ground troops.[42] In 1924 Weygand issued directives to his air units that closely resembled British air-control doctrine. He intended to use aircraft to bomb tribal groups when incidents occurred as a means of intimidating them into complying with the French regime.[43] The French increased their air presence in Syria and by the end of 1923 had several squadrons organized into the 39th Air Regiment.

From 1925 to 1927, the French faced a major challenge to their rule in Syria in the form of a revolt by 40,000 tribesmen (the Druze Revolt). The French quickly deployed 30,000 troops and additional air units to suppress the rebellion. The French army and air service saw some heavy fighting against the tough and well-armed Druze forces. They used air units extensively in reconnaissance and close-support operations for the ground troops. In some of the larger battles, such as the assault on the Druze stronghold at Soueida in December 1925, the French claimed that airpower played a decisive role, fixing and destroying a large Druze force in the turning point of the campaign.[44]

In Morocco in the 1920s, the French faced a level of fighting against warrior tribes that resembled the constant warfare the British faced on India's Northwest Frontier. By 1923 Marshal Louis Lyautey, the French commander, was heavily engaged in pacification operations in Morocco and requested reinforcements. The French government sent 36 army battalions and six air squadrons to Morocco.[45] By 1925 the French air service in Morocco had increased to 10 squadrons of mostly two-seater light bombers. However, even this large force could not handle an invasion of French Morocco by a well-armed nationalist force under Abd el-Krim, who led the Rif tribes and had destroyed an entire Spanish army in 1921.

The French air service, whose mission was primarily army support, saw extensive action. In 1923 the French had dropped 345 tons of bombs in Morocco.[46] Air operations were dramatically increased in 1925–26. In 1925 Marshal Lyautey requested reinforcements to face a major rebel offensive that pushed the French out of the highlands towards the coast. Aircraft saw constant action in support of the hard-pressed French defenders in an effort to delay the rebel advance. The combat was intense. In July 1925, the 10 squadrons of the 37th Air Regiment flew a total of 1,759 combat sorties against the Riffians.[47] Eventually, the French pacified Morocco, but tribal flare-ups were common into the 1930s.

In two respects, the French proved more innovative than the British in the use of airpower in colonial campaigns. First, the French relied much more on aerial resupply of outlying garrisons and small detachments,

using airdrops and light bombers as transports, which landed at small forward airfields. Aerial supply allowed the French to successfully maintain many isolated, small forces for long periods in the rugged terrain of Morocco's Rif region.[48] In Morocco the French established the first large-scale aerial medevac system. The French air service specially modified 22 Bloch 81, Potez 29, and Hanriot 431 aircraft (the Hanriot 437 was the medevac version of the Hanriot) and formed air detachments with the exclusive mission of air evacuation of the sick and wounded.[49] The French also established a regular system of collection points at forward airfields so that aerial ambulances could get wounded and sick soldiers from the battle lines to forward and central military hospitals in only an hour.[50] During the heavy fighting of 1925, the French evacuated 987 wounded and sick soldiers to rear hospitals by air.[51]

In his book on air control, David Omissi argues that the French had the reputation of being more ruthless and less humane in their methods of air control than the RAF. For example, he accurately characterizes the French as less likely to send warnings to villages before they bombed them, thus allowing no time for civilians to evacuate.[52] But one should note that the French faced a rebellion in Syria in 1925 that was essentially a conventional war. They suffered heavy casualties and fought some major battles just to hold on in parts of Syria.[53] The French also faced a more formidable and dangerous enemy in the Rif tribes in Morocco in the 1920s than the British faced in Iraq or the Northwest Frontier. In 1925, when Abd el-Krim attacked, the French retreated and built a defense line; they were hard-pressed just to hold those positions against the well-armed Rif forces, who were equipped with artillery captured from the Spaniards. In any case, although the French, under their air-control doctrine, regularly bombed tribes and villages, no evidence exists that they ever bombed the natives as a means of revenue enforcement, as did the British in Iraq. This difference in air-control doctrines between the French and British may indicate deep cultural differences between the two nations. A likely explanation is that the French are culturally more tolerant of and sympathetic to tax evasion than are the British.

## Creating the Myth

In the early years of air control, the RAF leadership carefully avoided offending the army or slighting the ground forces in their advocacy of air-control doctrine. As one RAF officer wrote in 1922, "It is not for one moment to suggest that aircraft alone can garrison any country without military assistance, but rather to show that economy in military strength and in money may be effected by a more extensive employment of aircraft."[54] Air Marshal Sir John Salmond, writing of his campaigns against Kurdish rebels in Iraq and his operations to drive back Turkish incursions on the northern border, gave full credit to the many British and Iraqi army units that had participated in the campaigns.[55] However, by 1929, after a decade of fairly successful air operations, RAF chief of staff Trenchard had such confidence in the effectiveness of air control that he proposed that the RAF assume defense responsibilities for Kenya, Uganda, Tanganyika, and Nyasaland. Airplanes could replace six battalions of the King's African Rifles in East Africa.[56] The army opposed this scheme as well as Trenchard's proposal to have the RAF take responsibility for the Northwest Frontier of India.

Once the future of the RAF as an independent service was assured—largely due to the success of the air-control program—the RAF and its supporters began to assert their views with considerably more boldness. Unsurprisingly, RAF accounts of air-control operations written in the 1930s tended to minimize the army part of the operations and magnify the role of airpower, so the role of the army in the RAF's account of air control gradually faded.[57] Indeed, one such account of air control in Iraq written in 1945 completely excludes any mention of the army in the colonial campaigns of the 1920s and 1930s.[58]

The primary criticism of air control was its function as a blunt instrument that operated on the basis of group accountability. The RAF would indiscriminately target a village or whole tribe for the transgressions of a small bandit gang or clan. Field Marshal George Milne, chief of the Imperial General Staff, criticized the RAF for its air-control techniques in Aden, arguing that constantly bombing the tribesmen would not create conditions for a peaceful administration.[59] Senior British officials in India, including the viceroy, disliked the airpower concept for similar reasons. Bombing villages and attacking civilians in order to punish a tribe for the actions of some of its bandits seemed not only morally doubtful but also politically risky, since it would likely increase the border tribes' hatred of the British.[60]

The RAF replied by emphasizing the humanitarian nature of the air-control system. Since the British warned tribes about impending bombing, the air attacks mostly destroyed property—and certainly did not kill many innocents. However, the warning policy was never very consistent. Often, officers in the field preferred that bombing take place without warning so as to achieve maximum effect. Indian Air Headquarters reluctantly accepted the requirement to warn in 1923 but argued that inflicting heavy casualties caused the greatest moral effect.[61] Although the Air Ministry maintained that warnings were always issued, in practice this was not true. Oftentimes, British aircraft bombed tribes on the Northwest Frontier in the 1920s without warning.[62]

Another RAF argument asserting the humanity of its operations emphasized the precision of aerial bombardment. The RAF Air Staff pointed out that air operations over the Northwest Frontier in November 1928 proved that the RAF could single out specific houses of tribal leaders for destruction while leaving the rest of the village unharmed—a true claim in a few cases. Carefully selected pilots and aircrews could in fact hit a target with some accuracy at low level. For the most part, however, the claim was frankly ludicrous. Usually, RAF bombing accuracy in the interwar period was appallingly bad. Of the 182 bombs dropped on tribesmen in the Northwest Frontier in November 1928, 102 completely missed the target villages.[63] Because the Bristol fighters that equipped many of the units flying air control lacked bombsights, only very low-level attacks came close to the target. In the border campaign of March 1932, only half the bombs dropped fell within the target villages.[64]

More embarrassing than not being able to hit the target was hitting the wrong target. Interwar gunnery and bombing training in the RAF were poor, and the service's navigation skills were no better.[65] In the hills of Kurdistan or on the wild Northwest Frontier of India, one valley and village looked very much like another. Coupled with often-mediocre intelligence and the fact that one group of tribesmen looked very much like another at seven thousand feet, it is understandable that villages of friendly tribesmen were sometimes attacked by mistake.[66] One cannot be sure just how often this kind of "imperial friendly fire" occurred. The victims had no means of reporting their outrage to parliament, and the RAF was not likely to report mistakes publicly. In any case, the official reports of the RAF and the writings of its supporters continued to maintain that the service's air-control methods were very humane, resulted in very little loss of life, and were always carried out with full warning.[67] Air control may not have won the good will of various native peoples, but it did a pretty effective job of keeping many of them in line—at least for a time.

In general, air control by itself seems to have had only very temporary effects. A tribe would steal cattle or raid a police outpost, get bombed, desist, and then the whole cycle would repeat itself in the next year or so. The RAF itself could handle only the smallest rebellion, but when it flew in support of army columns, it certainly made military operations more efficient. A couple of aircraft could provide the same level of support as a cavalry battalion for the army. The heavy firepower that aircraft could bring to the battle was a psychological shock to the enemy and a

great morale boost for British troops. However, that is not the way the RAF wanted air control remembered. Whereas critiques of air control circulated mostly within the closed circles of the government and the military, the RAF pushed its version of the success story in military journals, parliamentary reports, and releases to the general public. Eventually, the RAF view of air control became well established in the public mind.

The public and the government accepted air-control doctrine not as a result of its fairly modest success but because of the low cost. Journal and newspaper articles by RAF officers and supporters of air control invariably pointed to the much lower cost of conducting colonial police operations from the air. At a time that defense and colonial expenditures had to be kept low, air control proved cost-effective.

The true limits of air-control doctrine were displayed during the Arab revolt in Palestine from 1936 to 1939. The revolt started with an estimated five thousand insurgents, which grew to a force of 15,000 by 1938. Although most of the fighting, which consisted of small skirmishes and ambushes, occurred in the countryside, much of the combat took place in urban areas.[68] The British rushed thousands of troops to the colony. In 1938 alone, 486 Arab civilians, 292 Jews, 69 British, and 1,138 rebels were killed.[69]

Air Commodore Arthur Harris, commanding officer of the RAF in Palestine, proffered a characteristic solution to the revolt that foreshadowed his strategy as chief of Bomber Command in World War II. The solution to Arab unrest was to drop "one 250-pound or 500-pound bomb in each village that speaks out of turn. . . . The only thing the Arab understands is the heavy hand, and sooner or later it will have to be applied."[70] To the dismay of the RAF, the army rejected this approach, did not apply air control, and restricted the RAF to missions such as flying cover for convoys in ambush-prone rural areas.[71] The army wisely decided that air control had reached its limits and that the political reaction to employing airpower in largely urban areas would have exacerbated an already ugly situation and brought strong international protests. Unlike Iraq and the Northwest Frontier, Palestine was more urban and developed and had good communications with the outside world. Given the bombing accuracy of the RAF in this era, its aircraft would have soon leveled the wrong Arab village. Such an event would have received much publicity and would have brought the RAF's policy of air control under intense criticism. By turning down the RAF's advice in dealing with the Palestinian revolt, the army saved the RAF and its air-control policy from a grand failure. By confining air control to the more isolated reaches of the empire, one could portray the policy in a romanticized, if inaccurate, way.

## The US Air Force and Air Control

For many years, people have had a certain fascination with the interwar RAF's concept of air control. The first serious attempt to use its doctrine as a model occurred in 1948, when the US Air Force had completed only its first year as an independent service. Col Raymond Sleeper, a member of the Air War College faculty, became interested in adapting the air-control system of the 1920s and 1930s to deal with the increasingly hostile Soviet Union. He determined that British air control was cheap, effective, and a recognized means of achieving political ends with minimal force.[72] After identifying the critical factors of air control—air superiority, detailed intelligence, clear objectives, communication with the enemy leaders, and the ability to persuade (or coerce) an indigenous political structure to accept US terms—Sleeper obtained Pentagon and Air University support to put together a group of 10 officers and six civilians to study the matter in depth.[73] "Project Control" took on a life of its own, and by 1953 more than a hundred Air Command and Staff College students, as well as additional personnel detached from the Pentagon, were working on the project.[74] The reports crafting an air-control doctrine to deal with the Soviet Union never got anywhere, but one team came up with a proposal to deter China and defeat Communist insurgents in In-

dochina by means of an air-control doctrine based largely on the British model.[75] That report also met with little interest, and the project was shelved.

Years of low intensity conflicts and the assumption of peacekeeping operations in Lebanon and the Sinai by the United States in the early 1980s generated fresh interest in applying British air-control experience to current US Air Force operations and doctrine. In an article in *Air University Review* in 1983, Lt Col David Dean, USAF, presented an idealized version of the RAF's experience with air control. Dean saw air control as a cheap and effective means to police the empire, accepting uncritically the RAF's claims about air control made in the 1920s and 1930s. Colonial policing had been carried out in many instances by airpower alone. Although the army's methods of punitive expeditions had proved slow and ineffective, the RAF's bombing campaigns had achieved rapid effects, had been inexpensive, and had succeeded in achieving political effects with the least amount of violence.[76] Dean argued that the British had conducted air control humanely—with warnings and a minimum of violence—which had coerced tribesmen to comply with the British authorities and to harbor little ill will towards them.[77] By adapting the principles that the British had so successfully employed, Dean believed that the United States might build on its technological capabilities to apply air-control solutions to low intensity conflicts in the Third World. In this manner, the United States could avoid sending ground troops to the Third World, relying instead upon the Air Force to play a major role.[78] Other articles written by Air Force officers in this period also supported Dean's version of the air-control experience.[79]

The end of the cold war and the rapid increase of US military intervention overseas have also stimulated considerable interest in using the RAF's interwar air-control system as a model for US air operations. Articles and monographs by Air Force officers or by civilians working for the Air Force have presented the British air-control experience in a very positive light, as did Colonel Dean's articles.[80] Noted airpower theorist Carl Builder discussed British air control in an *Airpower Journal* article in 1995, arguing that it provided an excellent model for the kind of "constabulary missions" in support of the United Nations or peace operations that have come to characterize the current US military mission.[81] Builder pointed out that the RAF had done the lion's share of policing the empire with airpower and asked, "Could air and space power—by themselves—substantially pursue the constabulary objectives of the United States today?"[82] He argued that the US Air Force could and should look to conducting air-constabulary missions without committing ground troops.[83]

The concept that airpower alone can enforce the national will in low intensity conflicts is very attractive to the US Air Force. It certainly supports the idea that the Air Force ought to be the primary military service of the United States. The history of RAF air control has been used fairly consistently to support the position that an airpower-alone solution is possible. For instance, Air Force political scientist Robert Pape used the RAF's deployment to northern Iraq in 1924 as an example of successful airpower coercion. He points out that the Turks made incursions into Kurdistan and kept large ground forces on the border in an attempt to control the Mosul region. These incursions were met with a forward deployment of RAF squadrons and a few bombing raids to demonstrate British will. The British made it clear that if the Turks tried to cross the border in force, RAF attacks would seriously hinder their operations. Pape points out that this airpower coercion worked and that the Turks withdrew all forces from the border in October 1924.[84]

The problem with Dr. Pape's example of the effectiveness of airpower as a means of threatening an enemy army, as well as the argument by others that with airpower one can control regions and populations, is that the idealized air-control system described by US Air Force writers never really existed. For example, the RAF did play an important role in coercing the Turks to retreat from the Iraqi

border in 1924, but no one mentions that the army also deployed two brigade task forces (six battalions, two artillery batteries, one engineer company, and one machine-gun company) north of Mosul at the same time.[85] Throughout the era of British air control, in all but the cases of minor local banditry, the British met any serious challenge to their authority with both airpower and sizeable ground forces. Airpower alone put down none of the serious rebellions in Iraq. On the Northwest Frontier of India, airpower was a wonderfully effective force multiplier; however, one cannot escape the fact that these military actions were actually joint operations rather than airpower-alone operations.

## Conclusion

If one cannot really police an empire with airpower alone, then what are the lessons learned from the British experience in air control? I offer five lessons learned from the interwar RAF experience that ought to be relevant to modern military operations.

### *Clausewitz Was Right: War Is about Politics*

When confronted with fairly large native rebellions, British officers often seem to have been clueless about their causes. Lt Gen Sir Aylmer Haldane, British commander in Iraq during the national uprising of 1920, believed that the rebellion had occurred because British occupiers had been too soft on the Arabs, who had naturally taken advantage of British slackness. He declared that "Arabs, like other Eastern peoples, are accustomed to be ruled by a strong hand."[86] An RAF officer explained the fighting in Iraq in another way: "A large percentage of the tribes fight for the mere pleasure of fighting. . . . We oppose the tribes with infantry, the arm that supplies them with the fight. Substitute aircraft and they are dealing with a weapon that they cannot counter."[87] Evidently, British officers in Iraq did not suspect that the major rebellions in Kurdistan had anything to do with a political objective—such as the Kurds' desire for self-government. The British military apparently could not grasp that the "natives" might have strong nationalist sentiments and were fighting for a specific political objective—even though the British had encouraged such sentiments during the World War. After the war, the Colonial Office and Foreign Ministry quickly and conveniently forgot promises of self-government to the Kurds and Arabs.

In Iraq, during the four major rebellions in the 14 years of the British mandate, the British applied air control and military force to deal with the symptoms of the problem. By treating only the symptoms (rebellion), the British failed to look seriously at the primary cause of the conflicts—the politically unsatisfactory arrangement of the Kurds under the Iraqi government.

### *Multiculturalism Cannot Be Imposed by Airpower*

Without much thought, British political leaders cobbled together a large piece of the old Ottoman Empire consisting of three large groups that disliked and distrusted each other. The British imposed a multicultural state and system of government upon the population without any apparent plan. For 80 years, the three main ethnic groups of Iraq have been in a steady state of conflict, often exploding into large-scale rebellion. During this time the Kurds, in particular, have not given up aspirations for forming their own state.

Iraq is only one example of the failure of a major power to impose a multicultural state upon a country with large and mutually hostile ethnic groups. In Aden and the Sudan, British air campaigns temporarily suppressed conflicts among the tribes, but when the British pulled out, the ethnic conflicts remained. Indeed, one cannot find an example of a viable, stable, and peaceful multicultural state that has been successfully imposed upon a nation by an external power in the twentieth century. If Iraq is a typical example of the imposition of a multicultural state by superpower air and military forces, then the current US goal of imposing multicultural states upon unwilling groups in the Balkans is clearly in trouble.

### *Populations Adjust to Bombing*

The very first cases of air control, such as Somaliland in 1920, seemed to have worked very well. Aerial bombardment was a novelty, and its effect was impressive. However, as the British continued to use air-control methods on the frontiers of the empire, the psychological effect largely wore off. Many of the hostile tribes in Aden, on India's Northwest Frontier, and in Kurdistan learned to camouflage their camps and dig air-raid shelters for their villages. Tribes in Kurdistan set up a primitive warning system with observers and smoke signals to warn the most likely targets of the approach of British aircraft.[88]

In later campaigns against the Kurdish leader Sheik Mahmud, the British heavily bombed the rebel capital and center of operations, but the rebels fought on. Arabs fighting the British in Palestine in the 1930s were not overawed by RAF airpower. Indeed, the revolt in Palestine ended not through military force but through a political deal and British compromise that limited Jewish immigration.

### *Air-Control Skills Do Not Translate Well into Other War-Fighting Skills*

Air control took up a great deal of the RAF's effort and attention during the interwar period. For 20 years, the RAF took part in constant combat operations—either bombing campaigns or ground-support operations. Despite these operations, the air-control experience did not translate into tactics useful in conducting a major conventional war.[89] Surprisingly, 20 years of combat experience in supporting ground forces on the imperial frontiers did not develop into a close air support doctrine for the RAF when it went to war in 1939. Indeed, during the first years of World War II, the RAF could not provide effective close air support to troops on the battlefield. The organization, tactics, and control systems all had to be worked out from scratch during the first three years of the war. In short, although air control proved very effective in protecting the RAF's force structure and budget in the interwar period, no one showed interest in learning any lessons that might apply to a serious conventional war.

### *Beware of Serendipitous Solutions*

Air control looks like a perfect doctrinal solution to problems with some of the current peacekeeping operations that burden the US defense establishment. It appears cheap, looks effective, keeps US casualties low, and plays to the Air Force's strengths of precision and rapid response. As an airpower-alone or predominantly airpower solution, it is especially appealing to many Air Force people. In short, it looks like the ideal answer.

Of course, the reality of the situation differs considerably. Air control was never as effective as advertised, and it could not provide answers to the political causes of colonial insurgencies. Except in the case of minor policing, airpower served mostly as a support arm to ground forces. A colonial power in the 1920s could employ such a doctrine on the far reaches of the empire against natives who had no direct contact with parliament or the media. Even then, the RAF's air-control methods set off a considerable amount of protest from politicians. Basically, one could barely justify air control as a doctrine 80 years ago, and people who advocate an updated version of such doctrine for current US Air Force operations have misread history. □

**Notes**

1. See Philip Towle, *Pilots and Rebels: The Use of Aircraft in Unconventional Warfare, 1918–1988* (London: Brassey's Defence Publishers, 1989), 9–55, for a good overview of the RAF and the air-control program in the interwar era.

2. Maj Mark Dippold, "Air Occupation: Asking the Right Questions," *Airpower Journal* 11, no. 4 (Winter 1997): 78; Bruce Hoffman, *British Air Control in Peripheral Conflict, 1919–1976* (Santa Monica, Calif.: RAND, 1989); and Maj Michael Longoria, *A Historical View of Air Policing Doctrine: Lessons from the British Experience between the Wars, 1919–1939* (Maxwell AFB, Ala.: Air University Press, 1992). For a favorable view from Norway, see Nils Naastad, "Policing the British Empire from the Air," in *Use of Air Power in Peace Operations*, ed. Carsten Rønnfelt (Oslo: Norwegian Institute of International Affairs, 1997), 19–37.

3. Carl H. Builder, "Doctrinal Frontiers," *Airpower Journal* 9, no. 4 (Winter 1995): 1–6.

4. Flight Lt F. A. Skoulding, "With 'Z' Unit in Somaliland," *The RAF Quarterly* 2, no. 3 (July 1931): 387–96.

5. David Omissi, *Air Power and Colonial Control: The Royal Air Force, 1919–1939* (Manchester, England: Manchester University Press, 1990), 25–27.

6. A. Kearsey, *Notes and Lectures on the Campaign in Mesopotamia* (London: Hugh Rees, 1927), provides a useful summary of the World War I campaign in Iraq.

7. Alfred Burne, *Mesopotamia: The Last Phase* (Aldershot, England: Gale and Olden Ltd., 1936), 109.

8. Howard Sachar, *The Emergence of the Middle East, 1914–1924* (New York: Alfred Knopf, 1969), 368–70.

9. Ibid., 366–68.

10. David McDowall, *A Modern History of the Kurds* (London: I. B. Tauris, 1996), 152.

11. Sachar, 377–82.

12. Omissi, 123. Of the 131,000 armed rebels in 1920, the British estimated that 17,000 had modern small-bore magazine rifles and that 43,000 had "old but serviceable rifles." By 1921, in the aftermath of the rebellion, nearly 63,000 rifles had been collected.

13. Sachar, 369–72.

14. Mark Jacobsen, "Only by the Sword: British Counter-Insurgency in Iraq, 1920," *Small Wars and Insurgencies* 2, no. 2 (August 1991): 351–52, 358.

15. Ibid., 356.

16. Ibid., 357.

17. Omissi, 31.

18. Ibid.

19. Maj Gen H. Rowan-Robinson, "Iraq," *RUSI Journal* 77 (November 1932): 384.

20. In the summer of 1923, six infantry battalions of the Indian army were in Iraq. See "Air Force Notes," *RUSI Journal*, no. 472 (November 1923): 730.

21. Lt Col R. H. Beadon, "The Iraqi Army," *RUSI Journal*, May 1926, 343–54.

22. For a good example of a typical punitive operation in the British Empire during the nineteenth/early twentieth century, see Winston Churchill, *The Story of the Malakand Field Force* (1898; reprint, New York: W. W. Norton & Co., 1989). The book is Churchill's personal account of an expedition in which he took part.

23. Wing Comdr J. A. Chamier, "The Use of Air Power for Replacing Military Garrisons," *RUSI Journal* 66 (February–November 1921): 205–12, especially 210.

24. Cited in Towle, 20.

25. Ibid.

26. Ibid., 20–21.

27. Ibid., 19–20; see also Omissi, 182.

28. Omissi, 182.

29. Basil Liddell Hart, *The British Way in Warfare* (London: Faber and Faber, 1932), 155.

30. Maj Gen Sir Charles Gwynn, *Imperial Policing* (London: Macmillan, 1934), 114.

31. Robin Cross, *The Bombers: The Illustrated Story of Offensive Strategy and Tactics in the Twentieth Century* (New York: Macmillan, 1987), 70.

32. "Military Notes," *RUSI Journal* 66 (February–November 1921): 545.

33. "Air Notes," *RUSI Journal* 79 (February 1934): 194.

34. Omissi, 174.

35. McDowall, 155–63.

36. Lt Col G. P. MacClellan, "Air Co-Operation in Hill Fighting: Kurdistan 1923," *RUSI Journal* 72 (May 1927): 318–26, especially 319–20.

37. Ibid., 321–23.

38. Ibid., 324–25.

39. McDowall, 176.

40. Group Capt A. G. R. Garrod, "Recent Operations in Kurdistan," *RUSI Journal* 78 (May 1933): 231–51.

41. Ibid. See also Lt H. M. Curtis, "Shaikh Ahmed of Barzan and the Iraqi Government," *RUSI Journal* 77 (May 1932): 397–402.

42. Arnaud Teyssier, "L'Aviation Contre les Insurrections: L'Expérience Française au Levant au Lendemain de la Première Guerre Mondiale," *Revue Historique des Armées*, no. 169 (December 1987): 48–54, especially 52.

43. Ibid., 54.

44. Ibid., 55.

45. Jérome Millet, "L'Aviation Militaire Française dans la Guerre du Rif," *Revue Historique des Armées*, no. 166 (March 1987): 46–58.

46. S. Laine, "L'Aéronautique Militaire Française au Maroc (1911–1939)," *Revue Historique des Armées*, no. 4 (1978): 107–20, especially 113.

47. Millet, 54.

48. Laine, 112–18.

49. Capt W. Breyton, "L'Aviation Sanitaire au Maroc en 1933," *Revue de L'Armée de L'Air*, no. 56 (March 1934): 243–64. See the descriptions of aircraft on 246–48.

50. Ibid., 251–55.

51. Laine, 118.

52. Omissi, 193–96.

53. Tony Geraghty, *March or Die: A New History of the French Foreign Legion* (New York: Facts on File, 1987), 167–71.

54. Flight Lt C. J. Mackay, "The Influence in the Future of Aircraft upon Problems of Imperial Defence," *RUSI Journal* 67 (May 1922): 274–310, especially 299.

55. Air Marshal Sir John Salmond, "The Air Force in Iraq," *RUSI Journal* 70 (August 1925): 483–97.

56. Omissi, 57.

57. See Squadron Leader E. J. Kingston-McCloughry, *Winged Warfare: Air Problems of Peace and War* (London: Jonathan Cape, 1937). In the chapter on "Policing by Air," the author makes scant mention of the role of the ground forces in numerous operations, such as the campaign to expel the Turks from Kurdistan in 1923. See pages 201–57.

58. Hilary St. George Saunders, *Per Ardua: The Rise of British Air Power, 1911–1939* (London: Oxford University Press, 1945), 288–93.

59. Omissi, 165.

60. Towle, 40–43.

61. Omissi, 153.

62. Ibid., 155.

63. Ibid., 166.

64. Ibid., 167.

65. See Neville Jones, *The Beginnings of Strategic Air Power: A History of the British Bomber Force, 1923–1939* (London: Frank Cass, 1987), 111–17, 146–48. Although the RAF had a doctrine centered on strategic bombing, the force's basic navigation and bombing skills were very poor at the outbreak of World War II.

66. Ibid.; see also Towle, 18.

67. See Liddell Hart, especially chap. 7, "Air and Empire: The History of Air Control," 139–61. Liddell Hart, who accepted all of the RAF's positions on air control, was an enthusiastic supporter. As military correspondent for the *Daily Telegraph*, Liddell Hart was in a good position to influence the public and politicians.

68. Towle, 45–50.

69. Ibid., 48.

70. Cited in Hoffman, 32–33.

71. Towle, 50.

72. Lt Col David J. Dean, *Project Control: Creative Strategic Thinking at Air University*, CADRE Papers (Maxwell AFB, Ala.: Air University, August 1985), 3.

73. Ibid.

74. Ibid., 6–8.

75. Ibid., 9–11.

76. Lt Col David Dean, "Airpower in Small Wars: The British Air Control Experience," *Air University Review* 34, no. 5 (July–August 1983): 24–31, especially 27–28; see also idem, *The Air Force Role in Low-Intensity Conflict* (Maxwell AFB, Ala.: Air University Press, 1986), 19–27; and idem, *Airpower in Small Wars: The British Air Control Experience*, CADRE Papers (Maxwell AFB, Ala.: Air University Press, April 1985). The latter work is essentially the same as the *Air University Review* article.

77. Dean, "Airpower in Small Wars," 28–29.

78. Ibid., 30–31.

79. See Col Kenneth Alnwick, "Perspectives on Air Power at the Low End of the Conflict Spectrum," *Air University Review* 3, no. 3 (March–April 1984): 18–19.

80. See Longoria; and Hoffman.

81. Builder, 1–6.

82. Ibid., 4.

83. Ibid.

84. Robert Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, N.Y.: Cornell University Press, 1996), 333–34.

85. Salmond, 492.

86. Lt Gen Sir Aylmer Haldane, "The Arab Rising in Mesopotamia, 1920," *RUSI Journal* 68 (February 1923): 65.

87. Mackay, 299.

88. Omissi, 119–21.

89. Dr. Scot Robertson, "The Development of Royal Air Force Strategic Bombing Doctrine between the Wars: A Revolution in Military Affairs?" *Airpower Journal* 12, no. 1 (Spring 1998): 44.

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*Ordnung muß sein (There must be order)!*

—Field Marshal Paul von Hindenburg, 1919

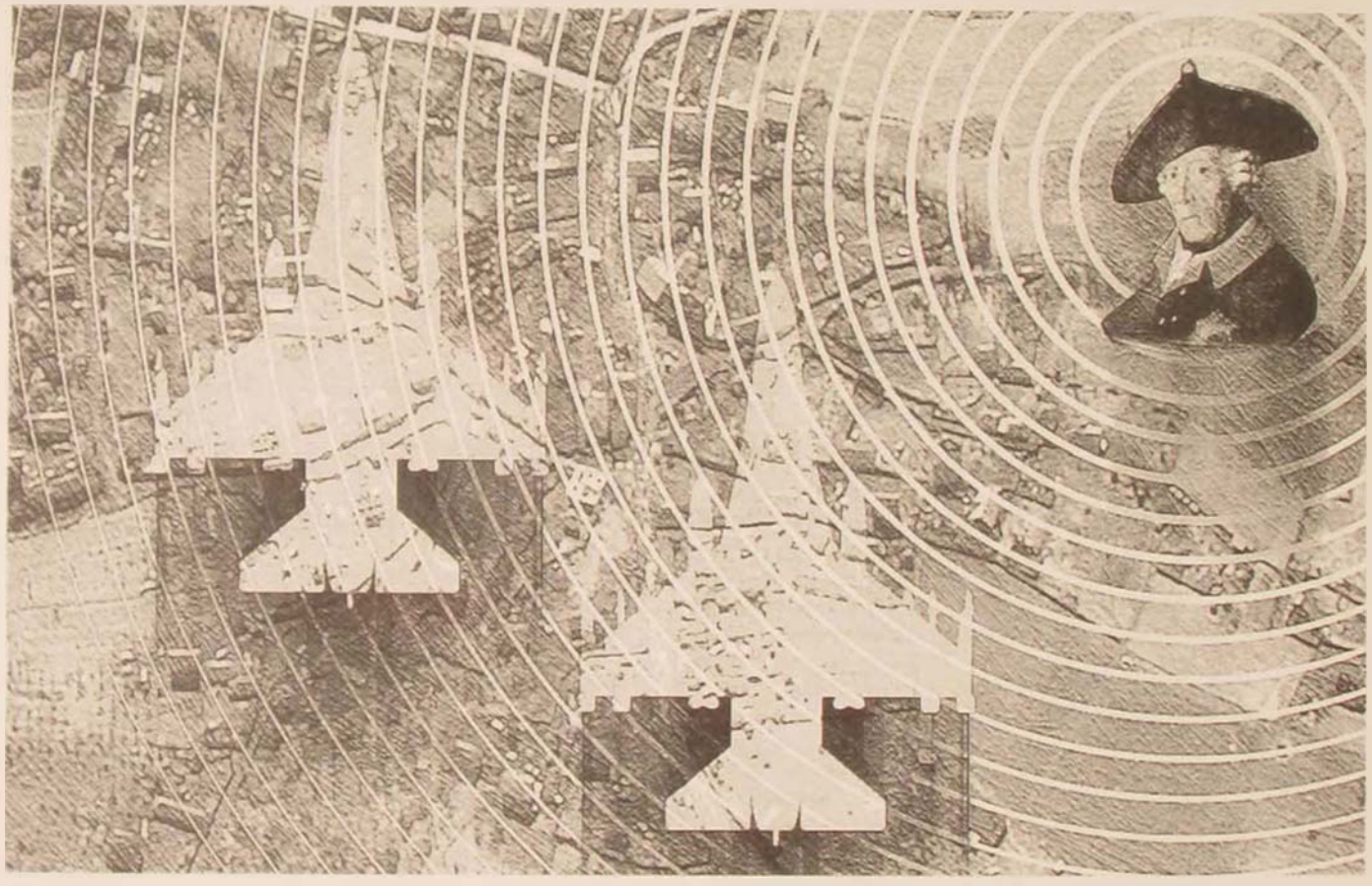
# Myths of the Air War over Serbia

## Some "Lessons" Not to Learn

DR. GRANT T. HAMMOND

*When blows are planned, whoever contrives them with the greatest appreciation of their consequences will have great advantage.*

—Frederick the Great



*Editorial Abstract: Did airpower win the war in Kosovo? In this companion piece to his article on the Gulf War in the Fall 1998 issue, Dr. Hammond challenges opinions about the success of Operation Allied Force. Airpower may have achieved all the military objectives asked of it, but the resulting end state in Kosovo is unsatisfying. He warns that this apparent "success" of airpower may lead to its erroneous future use in lieu of valid national objectives and strategy.*

THIS ARTICLE IS a sequel to my earlier piece "Myths of the Gulf War: Some 'Lessons' Not to Learn" (*Airpower Journal,* Fall 1998), which caused some consternation and discomfited many, for it seemed that I was criticizing airpower. I was not. I was criticizing those who do not understand its strengths and its limitations and who ask it to substitute for strategy. This article takes largely the same myths and tests those propositions against the backdrop of the air war over Serbia and the 78-day

bombing campaign that the United States and its NATO allies engaged in, regarding the fate of Kosovar Albanians and the province of Kosovo.

A representative dictionary definition of *myth* is "a traditional story of unknown authorship, ostensibly with a historical basis, but serving usually to explain some phenomenon of nature, the origin of man, or the customs, institutions or religious rites, etc. of a people; myths usually involve the exploits of gods or heroes; cf. LEGEND." It is also defined as "any fictitious story or unscientific account, theory, belief, etc." and "any imaginary person or thing spoken of as though existing." The headings in this article constitute imaginary beliefs about the air war over Serbia.

The propositions that follow represent commonly accepted assertions by, if not all, at least a large segment of both the American public and sectors of the American military. Once again, this is a cautionary note about the public's unfounded faith in the ability of the American military in general—and the US Air Force in particular. It is not a question of the military's ability to demonstrate its prowess in high technology as well as great tactical and operational skill—and to do so while sustaining low casualties. This it can do exceptionally well. But it is unrealistic to ask the military to do everything we ask simultaneously with other ongoing operations, poorly formulated strategies, and nonexistent visions of conflict termination and a better peace. Military capability is no substitute for viable strategy. The frequent use of military capabilities degrades them over time without reinvestment on a substantial scale.

There was much good that flowed from the air war over Serbia. Ethnic cleansing was eventually halted, the Kosovars returned to what was left of their homes, and a modicum of order was restored. In that, NATO did not fail. But the whole operation was made up as we went along and left much to be desired.

## It Was a War

*This was not, strictly speaking, a war.*

—Gen Wesley K. Clark
Supreme Allied Commander, Europe
NATO briefing, 16 September 1999

It was murder, ethnic cleansing, rampant looting and destruction, rape and pillage, guerrilla attacks, random firefights, and an air campaign. It was almost ritualized war, a demonstration effect that would lead to negotiations in three to five days. It began as "a drive-by shooting with cruise missiles," as one analyst called it.[1] It was a contest between a 19-member coalition and the rump of Yugoslavia over the sovereign territory of one of its provinces, which remains a part of Yugoslavia (Serbia) but is occupied by NATO's Kosovo Force (KFOR) troops and is neither independent nor autonomous. It became a serious matter when it was clear that NATO's capability and existence were at stake. These then became the real objectives in the application of force.

NATO's actions in the air war over Serbia and Kosovo were a series of extended raids, an air campaign, or an "air siege," as Gen John Jumper, USAF, described it. But the ethnic cleansing by the Serbs in their Operation Horseshoe was wanton murder and terrorism, and NATO's destruction of Serb infrastructure was undertaken with great care regarding collateral damage. Although both sides tried to kill the forces of their adversary, the contest had little of the fierce, large-scale, random death that we have come to associate with war. We need a better term to describe what happened there. As Anthony Cordesman has commented, "One of the lessons of modern war is that war can no longer be called war."[2]

## It's Over

*Now they have . . . a job to keep the peace in the Balkans. It is quite possible that this job will last half a century too.*

—Tim Judah, *Kosovo: War and Revenge*

Whatever "it" was, it's not over. The cycle of revenge killings, the animosity and hatred, the migration of refugees, and the military occupation of Kosovo continue, albeit with over 30,000 troops of a different military in place. What's more, KFOR forces are likely to be there for an extended period of time. Indeed, there is no "exit strategy," no end of military occupation, no conviction that if KFOR left, the bloodbaths would not immediately erupt again—just with different majorities and minorities. Indeed, it has spilled over into neighboring provinces and countries. One can hardly say it is "over," whatever that might mean.

The violence associated with the problems of Yugoslav secession and succession will likely continue. Some people go so far as to argue that actually a wider war will likely occur in the future—or at least larger issues will evolve out of the ones that remain unsettled.[3] Albania, Montenegro, and Macedonia have all been destabilized to different degrees as a result of NATO's action in Kosovo. Italy, Greece, and Turkey have strong feelings about issues raised in the area and the treatment of various refugees. Bulgaria's support for overflights was a welcome addition to NATO's air campaign. The entire area will be affected for some time to come, and—given a history of divergent goals and aspirations—stability does not seem to be a hallmark of the region.

## We Won

*Winning means what we said it means: Serbs out, NATO in, and Albanians back.*

—National Security Advisor Sandy Berger, 2 June 1999

But was that the test of winning? Those things have been accomplished—but to what end? If by "winning" we mean we stopped ethnic cleansing in Kosovo, we did not. It increased during the air campaign but eventually ended as the Serbs departed. If by this we mean we established an independent Kosovo, free of the clutches of Slobodan Milosevic and the Serb state, we did not. The ill-fated and wrongly named Rambouillet Accords did not contain even the promise of a future referendum on Kosovar independence. If by this we mean that we changed the Serbian regime and dispatched Milosevic, we obviously did not. Thus, there are no guarantees that the current situation can be sustained indefinitely. NATO is occupying the sovereign territory of another country. For how long?

Just what did we accomplish? We got the Serbian army and national police to leave Kosovo. We have NATO's KFOR troops in the province performing largely constabulary duties to try to prevent arson, rape, murder, looting, and smuggling. As the Albanians have returned, the Serbs have fled, and ethnic cleansing now runs in reverse. Some two hundred thousand Serbs have left the area, and feuding has increased among the factions representing the Kosovar Albanians. Does that mean we won? Protecting the Kosovar Albanians seems to be a problem, even with the Serb military gone, and protecting the Serbs who remain in the area is a more difficult problem still.

## We Accomplished Our Objectives

*Operation Allied Force was an overwhelming success. We forced Slobodan Milosevic to withdraw his forces from Kosovo, degraded his ability to wage military operations, and rescued over one million refugees.*

—Secretary of Defense William S. Cohen and Chairman of the Joint Chiefs of Staff Henry H. Shelton

As above, just what was our objective? If it was only driving the Serb military out of Kosovo, we did so. But nearly every public pronouncement on the air campaign and its objectives listed other goals critical to our success—or, more correctly perhaps, to Milosevic's defeat. According to the Kosovo/Allied Force after-action report to Congress, "From the onset of the operation, the United States and its NATO allies had three

primary interests: *Ensuring the stability of Eastern Europe . . . Thwarting Ethnic Cleansing . . .* [and] *Ensuring NATO's credibility*" (emphasis in original).[4] The first cannot be determined little more than a year out from the conflict, the second increased as we went to war, and the third is true if one believes that the test is NATO's making good on its threats. The aftermath of the encounter, however, remains to be seen.

We can't say we "won" because we did not accomplish the established goals. As stated by President Bill Clinton, these were "to demonstrate the seriousness of NATO's purpose so that Serbian leaders understand the imperative of reversing course, to deter an even bloodier offensive against innocent civilians in Kosovo and, if necessary, to seriously damage the Serbian military's capacity to harm the people of Kosovo."[5] It is not clear that NATO military action caused Milosevic to withdraw; the ethnic cleansing began in earnest after the air campaign began; and the degree to which Yugoslav fielded forces were degraded is hotly debated but seems far less than initial claims. No territory has officially changed hands. No war was declared, and no peace treaty has been signed. Hostilities continue although the Serb military and paramilitaries have left Kosovo.

## Technology (PGMs) Won the War

*Overall, the pinpoint accuracy of the NATO air forces' delivery of precision-guided munitions against fixed targets in the Serbian theater was very impressive.*

—Headquarters USAF, Initial Report, *The Air War over Serbia*

We used a significant number of precision-guided munitions (PGM) in this war—indeed, 35 percent of all the munitions used were PGMs.[6] And we exhausted much of our stocks of certain kinds of PGMs. The planes delivering the ordnance; the intelligence, surveillance, and reconnaissance capabilities of unmanned aerial vehicles; the prevalence of laser-guided bombs; the use of ordnance guided by the Global Positioning System; and our ability to utilize PGMs more effectively were all greatly enhanced since the Gulf War. So too were the far less costly, simple, and reasonably effective acts of deception used by the Serbs. But in a distressing preview of potential information operations by future adversaries, incidents of collateral damage—only 20 out of 23,000 strikes—had a major impact on both NATO and world opinion.[7] It may well be that media superiority is more important than air superiority and that the PGMs which matter most are precision-guided messages.

Definitive "effects and effectiveness" studies of the aerial munitions used during the 78-day air campaign have yet to be released, but it seems that the reality of the original claims will have to be discounted—by exactly how much remains to be determined. We did well against civilian infrastructure—less well against a dispersed enemy already in place, not on the move, and well camouflaged among the civilian population of Kosovo. The precise reasons for the ultimate Serbian withdrawal remain unclear; one cannot assert that PGMs won the war. Coalition perseverance, Russian arm-twisting, internal Serbian political disagreements, failure to crack NATO's political cohesion—all may have played an important role in that decision. We just don't know.

## The "Vietnam Syndrome" Is Over: US Military Might and Prestige Are Restored

*NATO wanted to use military power as a bargaining lever, and you know what? It worked—and we didn't lose a single airman in the process. . . . [Milosevic] ran out of options. None of that would have happened without airpower.*

—Gen Wesley K. Clark

Depending on what one's test of this proposition is, it may or may not be true. If we judge success on the basis of loss of American lives in combat, it was an unparalleled success. If, however, we judge success on the basis of accomplishing political and military objectives, some doubts are raised. Moreover, taking the land-combat forces off the table at the outset does not bode well for future conflicts. It is right to prefer to fight from technological advantage. It is wrong to preclude any option at our disposal from the outset. The ghost of Vietnam lingers in the leadership's not wanting to risk casualties. This is particularly true when it is not clear in the minds of the American public that the application of force is clearly in America's self-interest.

But the "base instinct" of force protection, represented not only by the concern for US and NATO losses in the air war over Serbia but also by the unseemly building of Camp Bondsteel—a little Fortress America in the middle of Kosovo for US troops based there—gives lie to the notion of escaping casualty phobia. As Jeffrey Record has declared, "Minimizing risk—force protection—has become more important than military effectiveness. The Vietnam syndrome thrives, and Allied Force's spectacular 78-day run without a single American or allied airman killed in action will stand as a beacon to future Presidents who want to use force without apparent risk."[8] Another analyst points out that if future adversaries see the reaction to casualties as a vulnerable center of gravity for the United States, then they will exploit it.[9]

## We Can Do It Again If Necessary

*Is NATO to be the home for a whole series of Balkan protectorates?*

—Henry Kissinger

Even attempting to do so would be highly unlikely. But fear exists that NATO may well have to deal with the "spillover" from Kosovo into Montenegro, Macedonia, or Albania and that conflicts in the region are not yet over. Because NATO has put out a marker once and declared itself concerned to the point of military action over stability on its periphery, "having another go"—as the Brits say—is a definite possibility. In effect, Kosovo has become a ward of NATO—it is not formally a protectorate, is technically still part of Yugoslavia, and has no promise of either autonomy or independence. How long will that be acceptable? It is almost a foregone conclusion that future conflict in the region will erupt. What NATO does about it is another matter.

Adding the thrust of NATO's new "strategic concept" unveiled at the 50th anniversary celebration in Washington to its commitment to "crisis management" and the possibility of a new command for the Balkans seems virtually to guarantee further disruption and a NATO response. The problem is that the alliance may not hold together, China and Russia may be even more hostile to such action than before, and the rest of the world may not sit idly by while another instance of a "new imperialism" is conducted on the world's televisions. Applying force in the southern Balkans again may be a very risky proposition, both militarily and politically. One may also see it as another test of NATO's existence, if not its credibility. As an article in US Naval Institute *Proceedings* suggested, it may only be "halftime in Kosovo."[10]

## Others Paid for the Cost of the War

*[The Center for Strategy and Budgetary Assessment] estimates that the deployment of seven thousand US peacekeeping troops to Kosovo would cost about $2–3.5 billion a year. This figure reflects the incremental costs of the operation (i.e., the additional costs that would be incurred by the US military, above normal peacetime costs, as a result of conducting the operation). It does not include all of the costs associated with providing humanitarian assistance to Kosovar refugees or rebuilding homes, fac-*

*tories, and other facilities damaged or destroyed during the NATO air campaign.*

—Center for Strategy and Budgetary Assessment, July 1999

Like buying a horse, the cost is ongoing. Even with European members of NATO agreeing to assume most of the cost of the rehabilitation of Kosovo after the war and with United Nations Resolution 1244 for the UN to assist in doing the same, it will cost the United States a minimum of $2 billion a year for a US contingent of seven thousand peacekeepers in the region. That is on top of an estimated $3 billion for the US share of Operation Allied Force. Thus, despite getting a pretty good deal—we pay for the war, you pay for the aftermath—US costs for Kosovo will approach $9 billion by the end of the current fiscal year. As long as we stay there, the costs will mount, and staying there may become the next test of NATO's credibility and existence, as unintended in the aftermath as they were in the conflict itself.

The implicit deal was that if we would do the bulk of the air campaign, the Europeans would provide the postwar funding for reconstruction and development. Little in the way of such funds has been received more than a year after the end of the conflict. Few people, if any, think that significant progress can be made in less than five to 10 years. Pessimists say 50 years is more likely. At a clip of $2 billion a year plus the cost of the war, the cost to the United States is on the order of $13 billion (low end) and $28 billion (high end). Splitting the difference, something on the order of $20 billion would be required, and that does not count foreign aid for refugee resettlement, rebuilding of infrastructure, housing, training of police, establishing a criminal justice system, and so forth. NATO's humanitarian impulse will be a very expensive proposition, and the US share—however small compared to the total—is not chicken feed.

## Unlike Our Past Wars, the Air War over Serbia Represents an Almost Unblemished Record of Success, Superior Military Performance, and Accomplishment

*[Reporter, repeating General Wald's assertion incredulously]*

*Q: Of all the bombs we've dropped, 99.6 percent have actually hit the target out of the 20,000 bombs. What percentage?*

*A: Maj Gen Charles F. Wald: 99.6 percent.*

—Pentagon briefing, 2 June 1999

One is reminded of the old saying that there are lies, damn lies, and statistics. The Air Force is good—very good—at what it does. But it is simply not that good, claims to the contrary notwithstanding. First of all, what is the definition of a target? A factory is different from a desired mean point of impact, and a target set is different from a target. A lot of targeted SA-6s and Serb vehicles were not hit. There are always blemishes and failures—things that can be done better and results that are less than satisfactory. We had trouble with deception and decoys. We expended a lot of ordnance on mythical targets or radar sites that weren't there. We certainly did not have the success rate that General Wald claimed unless one wants to work backward and say that if there were only 20 errant bombs or missiles out of 23,000 launched, one can assume that all the others that didn't miss egregiously must have hit. Then we might get such a figure. But it is overreaching in the extreme to argue in this manner.

The operational performance of the air forces involved in the air war over Serbia—US Navy and allied as well as US Air Force—was exceptionally good. But those forces attempted to prevent something that airpower cannot do. An F-15E pilot cannot—unless he is very lucky, not just skillful—prevent a man with a Zippo lighter from burning his neigh-

bor's barn or house or prevent another man with a knife from slitting a neighbor's throat. Doing so indirectly by attacking targets in Serbia was slow. Meanwhile, the terror in Kosovo continued. We should celebrate their skill in attempting to prevent what airpower could not ultimately prevent. But we should not overreach.

## The Promise of Airpower Was Finally Fulfilled

*Now there is a new turning point to fix on the calendar: June 3, 1999, when the capitulation of President Milosevic proved that a war can be won by airpower alone.*

—John Keegan
London *Daily Telegraph*, 6 June 1999

What promise of airpower? If by this we mean Giulio Douhet's claim that airpower is both necessary and sufficient to win a war, it appears it may have occurred—but we can't yet be sure. Stating that this is so is a case of *post hoc, ergo propter hoc.* There is no guarantee that this is the case. It appears that it *may* have at last been true. The application of airpower for 78 days over 37,000 sorties without loss of life in combat and only the loss of two planes (not counting the pilots and helicopters lost in the ill-fated Task Force Hawk) was truly remarkable. But we failed to destroy much of the fielded forces in Kosovo and instead destroyed civilian infrastructure in Serbia.

A host of other reasons could have entered Milosevic's strategic calculus and caused him to cave in to NATO demands. Even then, he got better than he would have gotten at Rambouillet. But we don't know why he did what he did. Did questionable targeting play a role? Did Russian envoy Viktor Chernomyrdin's visit do the trick? Did the absence of Russian support carry the day? Was he getting tired of getting his country bloodied for no real gain? Was there no chance to inflict casualties on NATO—his only real hope to crack the coalition? We don't know and may never know with certainty. Claiming it was due to airpower, although possibly true, may be overreaching. In any event, I would argue that the promise of airpower had been fulfilled long before the air war over Serbia. It was certainly demonstrated in the Gulf War, and one can make a solid case that it was demonstrated much earlier, in World War II.

Here I add a myth to those addressed in my earlier article. It is the most important one for us to ponder.

## The United States and NATO Accomplished Their Strategic Purpose through the Use of Military Force

*Our objective in Kosovo remains clear: to stop the killing and achieve a durable peace that restores Kosovars to self-government.*

—President Clinton, 22 March 1999

This is an important point. There was both a strategic failure in the disconnect between political and military objectives and a military failure in focusing on outputs rather than outcomes. The strategy adopted by NATO could reasonably guarantee neither the halt of ethnic cleansing nor self-governance for the Kosovars and a stable peace. Operation Horseshoe, the Serbs' ethnic-cleansing campaign, began in earnest after the bombing began, not before. Indeed, the agreement ending the 78-day bombing campaign places the future of Kosovo under UN auspices, where both China and Russia—opponents of NATO action to begin with—have vetoes in the Security Council. So, although some basis may exist for claiming another military triumph, it has not resulted in political victory. The purpose of going to war is to achieve a better state of peace, hopefully a durable one.

As Ivo Daalder and Michael O'Hanlon put it, "The stated goals of the bombing campaign were the three Ds: demonstrating NATO resolve, deterring attacks on the Kosovar civilians, and failing that, degrading the Serb capacity to inflict harm on the Kosovars.

But the military objectives of the bombing campaign were only indirectly related to the overriding political objective of achieving 'a durable peace.'"[11] The military objectives were perhaps achievable through the means applied, but the political ones were not. Taking the ground option off the table was poor strategy intended more to assuage Congress amid political crisis at home than to deliver a message to an international adversary. Having the military focus on its military objectives, however divorced from political requirements, is not a good precedent. The civilian political leadership and the military must jointly fashion strategy and specific goals. To allow a circumstance by which every successful "hit" against a Serbian military asset could be claimed as a degradation of Serb military capability may have been accurate semantically for the "spin doctors" of public relations. But unless this directly led to a durable peace, it was irrelevant to the political purpose.[12]

## Epilogue

The air war over Serbia was a masterful demonstration of airpower skill in terms of its military operational employment. The inherent advantages of airpower—perspective, speed, range, flexibility, maneuver, mass, and precision lethality—have both good and bad attributes. They make airpower too easy to use. The United States possesses the world's only full-service, "24/7" air force. That's a priceless advantage. It also makes airpower a ready military tool that can be deployed and employed quickly; relatively cheaply, at least in terms of lives placed at risk; and often, as testimony to policy convictions. It exists simultaneously—or so we think—as deterrent, offense, and defense. But that is just the problem. As Eliot Cohen has suggested, airpower is like modern courtship. It gives the appearance of commitment without necessarily the substance.[13] But if it is unhinged from strategy and political consequence, if it is merely used to punish and not coerce, if more is asked of it than the nation is willing to contribute, then airpower is squandered.

There is a double-edged sword in the apparent success of airpower. Able to be deployed and employed far from America's shores in support of US policy, it is often first to the fight. However imperfect an instrument to effect specific policy change on the ground, it is better able to apply force as testament to will than most of the other forms of military force—naval and land. That said, although it can readily be used, that may be its damning sin as well as its saving grace. Unless tethered appropriately to strategic intent and policy ends, it may be misapplied. Moreover, it is a finite resource. The people, platforms, and munitions are all perishable assets with both quantitative and qualitative limitations. And as forces get smaller, the ability to do several different types of air missions simultaneously over a long period of time becomes more and more difficult.

Airpower is a precious asset. Merely because it *can* be used does not necessarily mean it *should* be used. When it is used, it should be used appropriately to maximize its inherent capabilities. A nearly flawless operational application of airpower cannot substitute for a flawed strategy. Similarly, a less than desirable end state cannot be laid at the door of airpower alone. Most importantly, if airpower is to be the preferred tool of American force in service of statecraft, then it must be properly resourced in order to accomplish the task. At the moment, it is not. The US Air Force cannot be the principal custodian of airpower, responsible for the control and exploitation of space as well as air, *and* the custodian of information superiority and defense for the US military against cyber attack—with a budget share once dedicated to air superiority alone.

If the UN, NATO, and the United States seek to rely on airpower to address future problems in the international arena, then it needs to be better supported with investments in physical, financial, and human capital. This is even truer of our allies than ourselves. Coalition war may soon become a fiction as fewer and fewer current or would-be allies are able to acquire and utilize the tech-

nology involved in future air campaigns. If these are not forthcoming, then the capabilities will become hollow, and airpower will become incapable of fulfilling the tasks asked of it. It matters less whether these are of a lethal nature (as in the Gulf War and Operations Deliberate Force and Allied Force) or nonlethal nature (as in military operations other than war or humanitarian relief operations). Airpower is finite and ultimately limited.

In a curious sort of way, the myths of the air war over Serbia are part of the problem, not part of the solution in sustaining our investment in airpower. Claiming more than is its due is to be avoided. As the joint force air component commander himself—Lt Gen Mike Short, USAF, Retired—has commented about the air war over Serbia, "This was little more than random bombing of military targets that achieved victory by happenstance."[14] That is, luck may have had as much to do with our success as skill. Next time out, more attention to strategy and strategic effect and less on application of force to "demonstrate resolve" without regard to second- and third-order consequences would serve us all well. □

**Notes**

1. An oft-quoted and paraphrased remark made originally by Franklin C. "Chuck" Spinney at an Army War College Strategy Conference, April 1999.

2. Anthony H. Cordesman, "The Lessons and Non-Lessons of the Air and Missile War in Kosovo" (Washington, D.C.: Center for Strategic and International Studies, 8 July 1999), 9.

3. See the essays contained in *NATO's Empty Victory: A Postmortem on the Balkan War*, ed. Ted Galen Carpenter (Washington, D.C.: Cato Institute, 2000), particularly those by Radu, Mearsheimer, Dempsey, and Rizopoulos.

4. Message from Secretary of Defense William S. Cohen and Chairman of the Joint Chiefs of Staff Henry H. Shelton that accompanied their *Kosovo/Operation Allied Force After-Action Report: Report to Congress* (Washington, D.C.: Department of Defense, 31 January 2000), 1.

5. President Bill Clinton, 24 March 1999 Statement of Objectives, quoted in Headquarters United States Air Force, Initial Report, *The Air War over Serbia: Aerospace Power in Operation Allied Force*, April 2000, 5.

6. Cordesman, 9.

7. Ibid., 34.

8. Jeffrey Record, "Operation Allied Force: Yet Another Wake-Up Call for the Army?" *Parameters* 29, no. 4 (Winter 1999–2000): 16.

9. Earl H. Tilford Jr., "Operation Allied Force and the Role of Air Power," *Parameters* 29, no. 4 (Winter 1999–2000): 37.

10. Maj Gen J. D. Lynch Jr., "Truth in Kosovo: Is It Halftime?" United States Naval Institute *Proceedings* 125, no. 8 (August 1999): 2.

11. Ivo H. Daalder and Michael E. O'Hanlon, *Winning Ugly: NATO's War to Save Kosovo* (Washington, D.C.: Brookings Institution, 2000), 210.

12. Ibid., 211.

13. See Eliot Cohen, "The Mystique of Airpower," *Foreign Affairs* 73, no. 1 (January/February 1994): 109.

14. Comments made in an address to the Air War College, Maxwell AFB, Ala., 23 August 2000. Used with permission.

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*The theory of war and strategy is the core of all things.*

—Mao Tse-tung, 1954

# EMB-145SA and RS

## Brazil's New Eyes in the Sky

CAPT GILLES VAN NEDERVEEN, USAF*

*Editor's Note:* PIREP *is aviation shorthand for* pilot report. *It's a means for one pilot to pass on current, potentially useful information to other pilots. In the same fashion, we intend to use this department to let readers know about aerospace-power items of interest.*

ADVANCES IN RADAR, computer, and data-link technology have allowed airborne surveillance platforms to migrate from large commercial jetliners to smaller commuter-sized aircraft. The Brazilian air force has two new platforms entering service that will undoubtedly find their way into other air forces.

The EMB-145 airborne early warning and control (AEW&C) surveillance aircraft (SA), designated R-99A by the Brazilian air force, and the EMB-145 remote-sensing (RS) aircraft are both derivatives of the Embraer ERJ-145 regional jetliner, which has enjoyed worldwide commercial success. American air carriers use the 50-seat jetliner on regional routes throughout the United States. Both military variants were developed for Brazil's *Sistema de Vigilancia de Amazonia* (surveillance system, Amazon region) program, made up of both airborne- and ground-sensor systems designed to monitor activity throughout the Amazon basin.

The Brazilian air force currently has five EMB-145 AEW&Cs (fig. 1) on order and will assign them to the 2/6 Grupo at Anapolis Air Base near Brasilia, the federal capital of Brazil. To equip the aircraft to accomplish surveillance tasks, engineers had to strengthen its fuselage, install a more powerful auxiliary power unit, and add fuel tanks. The most visible change is the Swedish Erieye active phased-array radar, which is pylon mounted with a forward pitch along the top of the fuselage. Rather than a conventional rotodome, the Erieye is a fixed, pulse Doppler, dual-sided, and electronically scanned antenna operating in the E/F band.[1] Consisting of 192 transmitter/receiver modules, the Erieye provides 360-degree coverage with optimum-range performance achieved within a three-hundred-degree sector. Capable of detecting a fighter-aircraft-type target up to 186 miles away,[2] the Brazilian version of the Erieye has been optimized for detecting slow, low-flying targets typically encountered in border incursions.

The Brazilian air force's version of the aircraft will have four operator consoles and provisions for a relief flight crew of two—a pilot and copilot. All available systems functions can be controlled from individual consoles, thereby allowing operators to perform multiple functions rather than being role-dedicated. The aircraft is also equipped with

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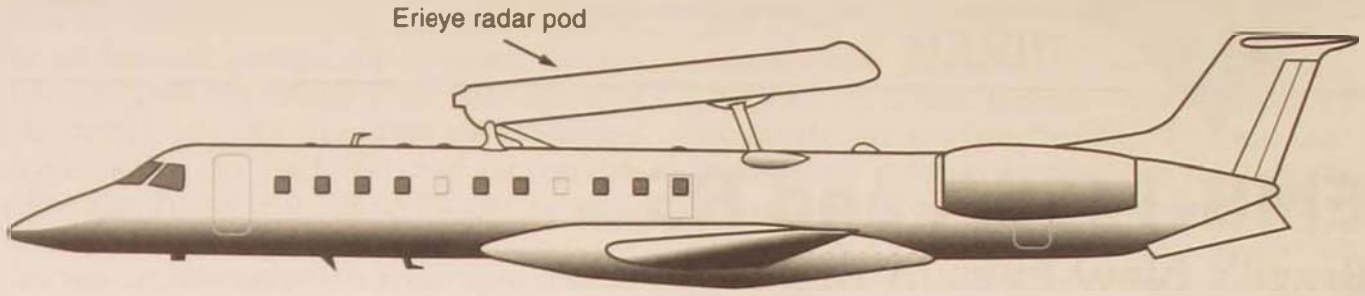


**Figure 1. EMB-145SA, R-99A (AEW&C version)**

a UHF data link, Global Positioning System capability, an electronic and communications intelligence system, and an improved radio suite. The data link will allow the R-99A to integrate data in real time with ground stations and airborne elements.

Capable of eight-hour endurance, these aircraft also have a high dash speed—Mach 0.78—allowing them to quickly reach operational patrol areas. In theory, four aircraft are enough to maintain two around-the-clock patrol missions, with one aircraft on continuous ground alert for more than 30 days.

The Brazilian air force is currently test-flying two R-99As, with Raytheon E-Systems doing the system-integration work in Greenville, Texas. The Brazilian air force should receive all of its aircraft by 2002. As a side note, the Greek air force has been the first export customer of the AEW&C version, and its four aircraft are scheduled to be delivered between 2002 and 2004. However, the Greek version will have an additional operator console, for a total of five. Systems-integration work will be carried out either in the United States or in Europe; this part of the contract is still subject to negotiation.

With a price tag of $200 million, the EMB-145 Erieye combination fills an emerging market niche. The price of the US Air Force's E-3 airborne warning and control system (AWACS) aircraft and newer systems such as the Wedgetail[3] or Phalcon[4] is simply too high for most countries. The combination of a radar and a commuter-type aircraft, however, has brought down the price. The original Swedish air force Saab 340 Erieye combination has not enjoyed any export success due to its lack of endurance. Most likely, the Brazilian aircraft/Swedish radar combination will enjoy considerable export success as other countries discover the affordability of the new AEW&C platform.

The EMB-145RS, designated R-99B by the Brazilian air force (fig. 2), is designed to monitor exploitation of natural resources, environmental and river-pollution control, economic activities, ground occupation, and illegal activities. Its primary sensor is a Canadian-made integrated synthetic-aperture radar-imaging system mounted in an underfuselage bulge with auxiliary antennas beneath the wing roots. It operates in a D-Band[5] mode and generates three-dimensional imagery. Other sensors are a forward-looking infrared/TV system mounted behind the nosewheel bay, an ultraviolet/visible/infrared line scanner, and an electronic and communications intelligence system. Using a data link and an improved radio suite, the aircraft will be able to exchange data with other airborne platforms and ground stations.

In order to crack down on illegal mining operations, which pollute waters with mercury, the Brazilian government has authorized the positioning of unattended water sensors in rivers and tributaries. An airborne R-99B will be able to query these devices, and its multispectral sensor suite will then allow the aircraft to detect the source of this kind of pollution. The same sort of detection work will also be used to track down drug-production complexes. Because the aircraft's synthetic-aperture radar is also capable of monitoring ground movement, it will be used

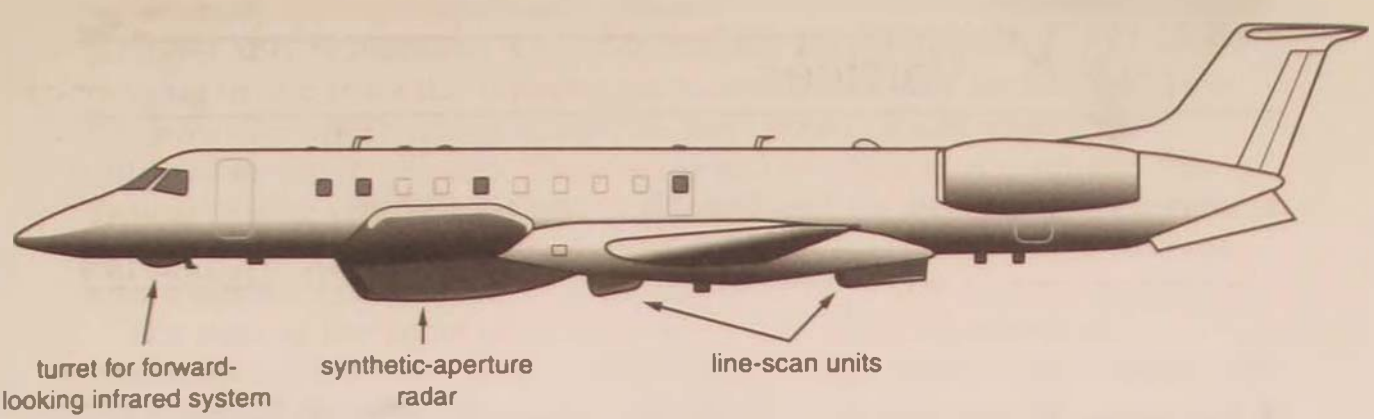


**Figure 2. EMB-145RS, R-99B (ground-surveillance version)**

to combat illegal logging operations. The Brazilian government also hopes to track other activities in the Amazon region, such as illegal migration and clear cutting for crops. This sensor combination will require the aircraft to fly under the clouds over the Amazon basin in order to observe some of the illegal activity that the government is eager to track. The EMB-145's flight profile should permit this without sacrificing mission length.

The Brazilian air force is buying three R-99Bs, with delivery scheduled between 2001 and 2002. These aircraft will serve alongside the R-99As at Anapolis Air Base in the 2/6 Grupo. At an altitude of 20,000 feet, these aircraft will be able to fly a nine-hour survey sortie. As with the AEW&C model, the Brazilian air force has developed a platform for export to other countries that wish to protect and control their natural resources. Indonesia, for example, requires such a patrol aircraft to monitor its vast island chain. Embraer has been marketing a similar R-99A and R-99B combination to Indonesia since the devastating Borneo jungle fires in 1998. The company is also marketing a maritime-patrol variant but so far has made no sales.[6] □

**Notes**

1. System characteristics include a frequency of 3.1–3.3 gigahertz (GHz) and a beam width of .7 degrees (azimuth) and nine degrees (elevation).
2. It can detect a one-square-meter target 98 miles away.
3. An Australian AEW&C aircraft using a Boeing 737 and a Raytheon antenna.
4. An Israeli Boeing 707– or IL-76–based AWACS.
5. System parameters include a frequency of 1–2 GHz. This frequency band is optimized for ground mapping with foliage-penetration capabilities.
6. See the following Internet resources:

**http://www.janes.com http://www.steel-eagles.co.uk/Directory/EMB-145_ERIEYE.htm**
**http://flug-revue.rotor.com/Frtypen/FRErstfl/FR99Erst/PREMB145.htm**
**http://global-defence.com/sam/sam2.htm**
**http:// www.embraer.com/english/produtos/index.htm**
**http://www.interaviabt.com/619/defence.html**
**http://airforce-technology.com/projects/emb/index.html**
**http://www.fas.org/man/dod-101/sys/ac/row/emb-145.htm**
**http://call.army.mil/call/fmso/fmsopubs/issues/vision.htm**. This site provides a good overview from a Brazilian perspective on why the Amazon basin needs to be protected.

*Always mystify, mislead, and surprise the enemy if possible.*

—Stonewall Jackson, 1860

# Using Lasers to Remove Orbital Debris

COL JONATHAN W. CAMPBELL, USAFR*

FOR SEVERAL YEARS now, the Air Force and the National Aeronautics and Space Administration have been working to understand orbital space debris with respect to the amount of risk it presents to spaceflight. Although the debate concerning the quantitative risk continues, everyone agrees that such risk exists and is expected to grow as our use of space expands. Associated with the first debate is a second question dealing with the threshold at which the risk becomes too high. This brief article does not attempt to answer these nontrivial questions concerning the definition of acceptable risk; however, it does bring to the reader's attention the following thoughts.

Mankind's expansion into space is vital to our future for many reasons. One of the most immediate and compelling is the need to respond to the threat of a potentially catastrophic impact from a meteorite, asteroid, or comet. We have no choice. We must expand into space, regardless of the risks. We must increase our capabilities there.

In addition to orbital debris, there are many other risks associated with spaceflight, and take-action thresholds must be balanced across the entire set of risks associated with a mission. In the space business, we decide at what threshold risks become too high and what action is warranted. The take-action threshold we assign to a particular risk is balanced against the possible impact on the mission, resources available to accomplish that mission, and our perception of the technical and cost feasibility of approaches for reducing that risk. The bottom line is that if we can conveniently reduce risk, then we should. With regard to the risk posed by orbital debris, we *can*—because of a promising, convenient solution.

*Colonel Campbell is the individual mobilization augmentee to the commander of the College of Aerospace Doctrine, Research and Education at Maxwell AFB, Alabama.

Presently, we have significant quantities of orbital debris of all sizes at all altitudes and inclinations. The distributions are not uniform, with debris ranging in size from the microscopic to several meters, such as worn-out satellites and upper stages of rockets. Fortunately, small objects far outnumber the large ones. However, speed as much as size creates risk. Typical closing velocities for a collision with orbital debris are on the order of 20,000 miles per hour. It is therefore hardly surprising that a collision with a satellite could result in mission failure.

The state of the art in protection from orbital debris allows us reasonably affordable, effective shielding against hypervelocity objects less than one centimeter (cm) in size. Yet, as size increases, so does cost—to prohibitive levels. We have calculated the cost for increasing the protection for critical modules on the space station from 1 cm to 2 cm to be on the order of $100 million for launch costs alone, not to mention research and development as well as manufacturing costs.

For objects greater than 10–30 cm in size, the space station relies on Space Command's tracking network to provide early warning. If an object is expected to come too close, the station maneuvers to avoid it. The total costs of this maneuvering system, however, are also substantial. In addition, this protection is not foolproof since Space Command may have difficulty maintaining continuous tracking of objects below 30 cm in size. In the event of a solar flare, for example, some objects may be lost for days at a time.

Presently, we have no protection against the approximately 150,000 objects within the size range of 1–10 cm. A hypervelocity collision between a tennis ball (approximately 5 cm) and a satellite would probably convert that satellite into orbital debris. Indeed, the cascade effect resulting from a large object being broken up into many smaller objects is a great concern for many scientists who study orbital debris.

Although the probability of a collision with a single asset is very low, one must also ask the global question, What is the probability of a collision occurring within the fleet—the entire population of space assets? When we look at the entire cross section, the probabilities become significantly larger. Indeed, current analysis indicates that, given current levels of orbital debris and asset cross sections, the probability is one collision per year. Something, somewhere is probably going to get hit next year, and hardware loss may be significant.

This is a global problem, as most environmental problems tend to be. We cannot make a single project responsible for cleaning it up. Indeed, costs to the fleet will be astronomical if each and every asset has to provide its own shielding and maneuver capabilities. Therefore, we must attack this problem at a higher level, and the most appropriate level may be an international collaboration led by the United States.

So what can be done, if anything? The answer lies in the convenient approach mentioned earlier. We have identified an elegant, cost-effective,

feasible laser-technology approach as a global solution to solve a global problem. Further, this solution is international in scope because it solves the problem for everyone.

If a high-energy laser pulse of sufficient intensity strikes a piece of orbital debris, a micro-thin layer of material is ablated from the object's surface. This superhot vapor rapidly expands outward, imparting a tiny amount of force to the object. Since current laser technology easily produces 10 to one hundred pulses per second, the ablation interaction can be rapidly repeated, over and over. The cumulative thrust acting on the object, if applied at the appropriate point in the object's orbit, is sufficient to lower its perigee below two hundred kilometers (km). At that altitude, atmospheric drag increases sufficiently to terminate the object within a few hours.

Using this approach, studies have shown that a single laser facility, costing less than $200 million and operating near the equator, could remove all orbital debris up to 800 km elevation in two years. Since satellites typically cost several hundred million dollars each and given the half-billion-dollar price tags on shuttle and Titan launches, this investment is relatively small, considering the potential return. In addition, as discussed above, we are already well above these levels of funding to provide risk reduction to some individual assets. In addition, technology development in this area will serve as a springboard to many other approaches on a larger scale, such as using laser-power beaming to deflect meteorites, asteroids, and comets, as well as propulsion for interstellar missions.

Again, we have identified a promising, convenient, and elegant laser approach to reduce the risk to spaceflight posed by orbital debris. Only this nation has the capability to accomplish this project. If it is going to happen, we have to make it so. □

*Maxwell AFB, Alabama*

**Ricochets and Replies**
*Continued from page 5*

there is no difference between air and space. Of course there are differences. *Aerospace as an adjective* is geared towards obviating the pointless debate over those environmental differences where they really are not relevant—at the operational level of war.

Should we be alarmed that the new AFDD 2 clarification is not used verbatim in the white paper of May 2000? Not at all. Ultimately, like all living things, the Air Force's concept of *aerospace* is evolving. It will continue to evolve as long as the Air Force cares about being the preeminent aerospace force. In the meantime, we see no inconsistency—in substance or philosophy—between how current, approved Air Force doctrine defines *aerospace* and how the service's leadership is using the term in its forward-looking Air Force vision.

**Maj Gen Lance Smith, USAF**
*Commander, Headquarters Air Force Doctrine Center*
*Maxwell AFB, Alabama*

## A MODEST PROPOSAL

As the Air Force moves toward a new way of operating through the aerospace-expeditionary-force concept, it is time to change the way we think and learn about airpower and the Air Force's role in future conflict. Many avenues can lead us to this goal. Professional military education, professional reading, experience, and mentoring are a few of the possible methods. Soaking up experience in the office, at lunch, or at the club is just about the cheapest way to learn. To facilitate this type of learning, I recommend that the *Aerospace Power Journal* begin a new department devoted to providing Air Force members across the spectrum of ranks and Air Force specialty codes the opportunity to talk and think critically about the pressing issues facing the future Air Force. The general concept would involve providing a problem or dilemma to *APJ*'s audience and then inviting readers to submit their solutions for publication. Publishing the best three or four solutions, allowing for some "outside of the box" ideas, would not only encourage new ways of thinking about some of our problems but also stimulate new solutions to problems we have not yet faced. Possible problems could include a range of strategic and operational airpower issues as well as leadership dilemmas from which everyone can learn. I believe that this venue, coupled with our other educational programs, would greatly enhance the concept of "air-mindedness" among *APJ*'s readership.

**Capt Chris A. Golden, USAF**
*Andrews AFB, Maryland*

## CASUALTY CONCERNS

Dr. Jeffrey Record ("Force-Protection Fetishism: Sources, Consequences, and [?] Solutions," Summer 2000) and Maj Charles K. Hyde ("Casualty Aversion: Implications for Policy Makers and Senior Military Officers," Summer 2000) overlook one important fact in their criticism of current policies that seek to minimize casualties. To justify policies that allow for a higher number of casualties, they cite research showing that the public is willing to absorb a greater loss of life to achieve national objectives than are the military elite. The reason for this is that the public does not bear the cost of war and has come to see troops as expendable pieces in a global chess game.

Mandatory military service for all men and women would change public opinion in this area dramatically. Only when all the sons and daughters of Americans find themselves in harm's way can the nation accurately determine whether the benefits of any campaign are worth the cost in human life.

**John Williams**
*San Francisco, California*

I wish to highly commend *Aerospace Power Journal* for its excellent four-article series on casualty aversion (Summer 2000). The arti-

cles were stimulating and, most of all, important. Although I differ with the authors on a number of points, I prefer to advance the argument rather than debate these matters.

But first, let me inject a dose of skepticism into one of their central points. Much is made of the finding that the public would tolerate higher casualties than would either the civilian or military leadership, implying that leaders are out of step and unnecessarily self-restrained. I wonder how the public will react when body bags begin arriving in the United States and when graphic pictures appear in American homes? How supportive will the American public be when hypothetical becomes reality? The decline in the percentage of civilian leaders with military experience also leads me to question how solid civilian leadership will be if events turn sour. With that one caveat, let me make a number of observations.

1. Casualty aversion is not just an American problem. Although many people believe that democracies are more susceptible to these pressures than are authoritarian states, the Russian withdrawal from Afghanistan and Chechnya indicates that is not altogether true. Heavy casualties and a questionable cause, coupled with indecisive results over a period of time, led to the collapse of Russian will.

2. The decision makers and the public must be educated to understand that using military force puts people at risk. Murphy's Law ("friendly fire," for example) will apply with tragic consequences. People—good and bad, innocent and guilty, friend and foe, civilian and military—will die when lethal force is applied. Therefore, we must carefully consider the costs and benefits of our actions and inactions.

3. There is much more to the lack of US support for intervention than just aversion to casualties. One factor is the lack of a clear, vital cause. The American people have demonstrated that they will expend blood if they believe it is for a justifiable cause. Certainly, the end of the cold war has made American intervention more difficult to justify. Without a peer competitor, it is more difficult to argue that American national interests are at stake. (The cold war allowed the United States to support a number of ruthless dictators against the Red Menace.) Doing "good" in the world is fine, but it must not be too costly, uncomfortable, or unrewarding for Americans.

4. Another factor is the American demand for creditable and perceivable results ("success") in a reasonable time period. An important reason for the unpopularity of both the Korean and Vietnam Wars was their prolonged and indecisive nature. The military history of the United States indicates that we can best fight quick, successful wars or crusades but have difficulty with limited wars and extended conflicts for unclear goals and with no demonstrated success. Put another way, it may well be that America can be successful in only two kinds of wars: (a) a crusade in which American vital interests are endangered and the country is rallied to fight a demonized foe and (b) a quick, cheap, decisive action.

5. A third factor in the American reluctance to intervene is the way recent interventions have been conducted. Coalition operations have never suited American tastes, and military peacekeeping is an alien concept for most Americans. The public's perception of allied and world public opinion may well be critical, for Americans like to be loved and appreciated.

The bottom line, then, is that casualty aversion is an obstacle to committing US military forces to war but only one of a number of factors. It may well be that this is only a cover for other reasons not to act, such as the inconvenience it will cause to reservists called to active duty, the fear of events turning out poorly, the cost in dollars and political capital, and just a plain lack of will.

Therefore, don't overdo this reaction to casualty aversion and the apparent gap between leadership and popular taste for intervention. Casualty aversion is understandable and isn't all bad. Certainly, before we risk American treasure, prestige, and—most of all—lives, we should be fairly confident that the action is worthwhile. Possible casualties should not paralyze US actions but should give leaders pause. They must be realistic with policy aims, carefully consider costs and benefits, and not overreach. Most of all, positive political leadership is required—leadership that can make clear, forceful, and candid statements of understandable aims to the public and to the troops.

**Kenneth P. Werrell**
*Maxwell AFB, Alabama*

## EXPANDING THE CAPABILITIES OF UNMANNED AERIAL VEHICLES

The cadre at the USAF Unmanned Aerial Vehicle Battlelab was enamored with the assessment of command and control and UAV interoperability by 2d Lt David Ortiz ("A New Role for Today's UAVs," Fall 2000). Although we share his high regard for the future of UAVs, he predicts a "future" that's both past and present. The UAV Battlelab and others in a rapidly growing UAV community have been busy making his and others' visions into reality.

In September 2000, during Joint Expeditionary Force Experiment 2000 activities hosted at Nellis AFB, Nevada, UAV battlelabbers joined with Predator and joint surveillance, target attack radar system (JSTARS) operators to successfully provide the JSTARS Moving Target Indicator picture directly to the Predator ground station. The picture was used to cue the Predator sensor/payload operator to locate and identify mobile targets. This is only the most recent of the many successes the Battlelab has enjoyed.

In February 1999, engineers and operators successfully used the in-place satellite communications network and emerging JSTARS technology to inject Predator UAV imagery directly into a JSTARS platform. On the near horizon is Forward Area Launch and Control (FALCON), an initiative to demonstrate direct command and control and battle management of UAVs from airborne warning and control system (AWACS) aircraft.

Wherever he is, Lieutenant Ortiz can sleep well, knowing that the UAV Battlelab, as well as the Aerospace Command, Control, Intelligence, Surveillance, and Reconnaissance Center; the Global Hawk, Predator, and Unmanned Combat Aerial Vehicle System Program Offices; the Defense Advanced Research Program Agency; and others are awake and hot on the trail.

**Lt Col William A. Malec, USAF**
*Eglin AFB, Florida*

## IMPLICATIONS OF BATTLEFIELD CIVILIANS

With regard to Lt Col Lourdes A. Castillo's article "Waging War with Civilians: Asking the Unanswered Questions" (Fall 2000), it is plain to see that the military has outsourced for expertise and not cost savings. But what sacrifices will the military have to endure (decay of military morale, retention, training, etc.)? These are concerns that must be dealt with immediately by senior leaders in the Air War College (AWC) curriculum. AWC war games should take into account the closure of bases and the high influx of civilian personnel. What are the political and psychological impacts of these decisions? Who will eventually pay the price?

**Capt Kendall Scipiaruth, USAF**
*March ARB, California*

## STOPPING A COMMON MISCONCEPTION

As a missileer and former avionics-sensor-system instructor who enjoys your publication, I wish to request that you please stop

perpetuating an error! Page 69 of Dr. David Mets's article "The *Force* in US Air Force" (Fall 2000) contains a reference to the acronym "FLIR," explaining it as "forward-looking infrared radar." But the reference to *radar* is not accurate since the "IR" in the acronym refers only to *infrared.* Infrared and radar represent different wavelengths in the electromagnetic spectrum. Many systems, such as low-altitude navigation and targeting infrared for night (LANTIRN), package FLIR, terrain-following radar, and laser subsystems, but "FLIR" refers only to the passive infrared receiver system.

**Lt Anthony Zilinsky, USAF**
*Cheyenne AFB, Wyoming*

*Editor's Note: Thanks for the correction. The error was ours and not Dr. Mets's.*

## BENEFITS OF THE UCMJ

I just finished reading Maj Lisa L. Turner's "The Articles of War and the UCMJ" (Fall 2000). Hats off! Her use of the Sincock/Balides case to set the foundation of this article was brilliant. As military members, many of us take the Uniform Code of Military Justice (UCMJ) for granted. We tend to concentrate on what the military is taking away from us and not so much on what we are provided. Major Turner does a great job informing the reader of how important the UCMJ is to establishing and maintaining military discipline. It is a well-known fact that our sense of discipline is one of the reasons the US military is so highly respected.

The purpose of the UCMJ is to define, as clearly as possible, the do's and don't's of serving in our nation's military. People need to respect something before they will abide by its boundaries. In this case, someone's respect for the boundaries of the UCMJ should mean never having it work against him or her.

Military members of all grades should have a working knowledge of the UCMJ. Supervisors should discuss this document and its benefits with their troops. The fact that nobody spoon-fed this information to us is no reason not to give our troops as much information on the subject as possible. We may have to do some of the research and legwork, but, all things considered, isn't it worth the effort?

**TSgt Thomas B. Mazzone, USAF**
*Duke Field, Florida*

## BOOK REVIEW KUDOS

I appreciate your "aerospace" perspectives (vice "air" or "space"). *APJ*'s "Net Assessments" section is always very informative and challenges my thinking with multiple points of view. Keep up the literary recommendations—great stuff!

**Capt Jeffrey Moore, USAF**
*Cheyenne, Wyoming*

*Manchuria with its industrial complex, coal, and iron ore is the Ruhr of China.*

—Lt Gen James M. Gavin, 1966

**Chinese Policy toward Russia and the Central Asian Republics** by Mark Burles. RAND (http://www.rand.org), P.O. Box 2138, Santa Monica, California 90407-2138, 1999, 84 pages, $15.00.

This book observes the factors that have recently led the People's Republic of China (PRC) to pursue a warming of ties with Russia and the former Soviet republics of Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan (countries commonly referred to, in international relations, as the Stans). Although the book mainly addresses why the PRC seeks to maintain stability in the Stans and an amicable relationship with Russia, the author also covers the adverse impact that expanded Chinese regional influence would have upon Sino-Russian relations; barriers to increased Chinese influence over the Stans; and, ultimately, the potential impact that Chinese regional dominance would have on US policies in Central Asia. Due to its narrow scope, this book will primarily be of interest to area specialists, intelligence personnel, and policy makers who want a more in-depth understanding of the motives behind Beijing's desires to expand its sphere of influence in Central Asia and the effects that such an expansion could have on the balance of power in the region.

The author boils down the wide range of geostrategic issues that drive the PRC's policies toward Russia and the Stans to four considerations: (1) a desire for stability on its frontier and border provinces, (2) a desire to enhance economic development of its inland regions, (3) its growing energy needs, and (4) its position in the post-cold-war strategic environment. These considerations also form a means for Beijing to determine how to tailor its approach toward expanding relations with each state in the region. According to Burles, the Sino-Russian relationship is of paramount importance in the strategic sphere, while expanded ties with the Stans are aimed at promoting stability within the PRC's borders and protecting against outside threats.

Central to the first consideration is the PRC's need to maintain the stability of the Xinjiang Uighur Autonomous Region (XUAR). Residents of the XUAR have far more in common with the Turkish and Islamic populations of Central Asia than with the PRC's ethnic Han Chinese population. Given this fact, the PRC cannot afford to have the Stans exporting Islamic fundamentalism or nationalism to the XUAR. If the secular governments of the Stans fail, the ensuing regional instability could threaten the energy resources of the three oil basins in Xinjiang and throw into turmoil a region that "has historically served as a buffer against potential aggressors from the mountains and steppes northwest of China" (p. 10). One can argue that the third consideration—involving the development of overland (pipeline) routes from Central Asia and Siberia to meet the growing energy needs of the PRC—is of far more importance to Beijing than the economic development of its inland regions. The increased development of lines of communications to further the transport of trade and energy resources will inevitably spur development of the PRC's inland regions, thereby making the second consideration somewhat moot. The fourth consideration illustrates the PRC's desire to make the world a more multipolar environment in which the hegemonic influence of the United States is, at a minimum, offset by "a broad network of secure regional and global relationships . . . able to offer China alternative sources of trade, technology, investment, and international political support should China's relationship with the United States deteriorate" (p. 34).

The expansion of Beijing's influence in Central Asia will undoubtedly have an effect on American and Russian policies in the region. Ironically, Russia and the United States share the PRC's goal of promoting secular governments and diminishing the influence of Islamic radicals in Central Asia. Although they agree on promoting stability, Moscow and Beijing will remain at odds with the United States over numerous issues. Even though several analysts believe that their mutual displeasure over US policies will prove sufficient to bolster their strategic partnership, it will not be enough to overcome the friction resulting from their competition to dominate the Stans. Given their mutual

distrust, it is in fact more likely that "Russia will likely face a choice between the increasingly close embrace of more dynamic China and attempting to find regional and global partners to help balance Chinese influence" (p. 48). Although it is in both of their interests to avoid conflict, we can see from this quotation that relations between Moscow and Beijing are more likely to deteriorate than improve in the near term.

Burles's closing chapter tackles the question of how an expansion of Beijing's regional influence will affect the United States. To his credit, rather than drawing out his analysis, the author is quick to explain that "many aspects of China's relationship with Russia and the Central Asian Republics . . . have no real impact on American interests" (p. 61). In short, most of the PRC's motivations to expand its influence in Central Asia have little to do with its relationship with the United States. As regards the potential for conflict between the United States and the PRC, the author believes that this would not occur unless "Chinese actions in the region begin to restrict international access to energy resources" (p. 63).

*Chinese Policy toward Russia and the Central Asian Republics* is brief yet informative. It is a thorough study, narrow in scope, and intended primarily for strategists and policy makers who have a need to keep abreast of the geostrategic issues in Central Asia. I recommend it to researchers working on a broader topic involving the aforementioned countries or to readers who simply hope to expand their knowledge of the issues that will continue to dominate the balance of power in the region.

**Capt Clifford E. Rich, USAF**
*F. E. Warren AFB, Wyoming*

**Air Commando One: Heinie Aderholt and America's Secret Air Wars** by Warren A. Trest. Smithsonian Institution Press (http://www.si.edu/sipress), 470 L'Enfant Plaza, Room 7100, Washington, D.C. 20560, 2000, 271 pages.

Warren A. Trest has written a good book about a great airman. Harry C. Aderholt is one of the legends of Air Force special operations, and Trest tells us why. *Air Commando One* follows Aderholt's career from the early days when Air Force special operations dropped Korean agents behind communist lines in 1950 to the evacuation of our Hmong allies from Laos as the communists triumphed throughout the region in 1975. Aderholt participated in a breathtaking number of "secret air wars" and was usually in command. His achievements under extraordinarily difficult conditions and byzantine command and security arrangements are truly awe inspiring. The psychologist will be disappointed that the book does not provide greater insight into Aderholt's family life; the historian will be disappointed that the book provides only Aderholt's part of the operations described rather than a more complete picture of the operations as a whole; and the skeptic will be concerned that not enough bad things are said about Aderholt. But those people within the special operations community will appreciate the very personal perspective the book provides on covert and clandestine operations and the early days of the Air Force Special Air Warfare Center. Aderholt had the career we all hoped we would have, and his subordinates say the sorts of things about him that we wish our subordinates would say about us. This is just the sort of inspirational book young Air Force Special Operations Command (AFSOC) officers and noncommissioned officers (NCO) should read and reread.

This book, however, is more than just a collection of hair-raising flying stories and examples of good leadership. Trest also tries to address the traditional conflict between the "Big Blue Air Force" and the Air Force special operations community. Trest does this mainly through Aderholt's conflict with Gen William W. Momyer in Vietnam. In Trest's view, their conflict centered on the issue of centralized control of airpower. Unfortunately, Trest pursues the argument only as far as Aderholt and Momyer did and does not get as deeply into this issue as he might. For example, Trest supports Aderholt's view that sometimes centralized control decreases the effectiveness of airpower (absolutely true), but he neglects the fact that *bureaucratically* centralized control enhances the power and prestige of the Air Force and helps make more airmen generals. Even if centralized command were marginally worse from a combat-effectiveness standpoint (and in Vietnam it often was) and even if it did not mesh so nicely with General Momyer's comments, its decisive bureaucratic advantages would have made it almost irresistible. Aderholt never had a chance on this one.

When Momyer took command of Tactical Air Command (TAC), all of Air Force special ops came under his purview, and things did not go well for special operators generally and Aderholt in particular. Unfortunately, Trest (and probably Aderholt) once again does not think deeply enough about

why the Air Force hierarchy was so hostile to special operations. A little consideration would point out that, as a rule, special operations are low-cost, high-risk, and high-reward operations. However, institutions like the military services are extremely risk-averse and measure their value by their budgets. In this calculus, low cost is bad, and high risk is horrendous. Worse yet, the high rewards of successful special operations often do not go to the services. If the Khamba tribesmen to whom Aderholt airlifted supplies had won some sort of autonomy for Tibet, it would have been great for Tibet and perhaps the CIA, but what would it have done for the Air Force? Aderholt didn't ask, but TAC commanders did, and they often felt that finding high-tech, high-cost solutions to obvious challenges (like shooting down enemy planes) made a lot more sense than finding better ways to secretly support the CIA, the Khamba, or some other shadowy weirdos. Even the least thoughtful members of Aderholt's units should have realized that if their operations required carrying false ID cards that did not link them to the US Air Force and required them to paint over all the Air Force markings on their aircraft, then the Air Force was probably not gaining much from the operation. If Heinie realized this, Trest does not tell us.

Although institutional support for special operations forces has increased dramatically over the past decade, institutional outlooks have not always kept up, and the sorts of constraints and risk aversion Aderholt complains about will be very familiar to the current generation of AFSOC leaders. It is important to note, however, that while Aderholt (and special operations) developed some powerful enemies within the Air Force, he (and special operations) also had many powerful friends. Aderholt did eventually make brigadier general, and many good men don't. This was a testament to his enormous talent but also showed more open-mindedness in the Air Force leadership than some give it credit for. The junior officers and NCOs who read this book should remember that doing the right thing may make them some enemies, but it will also make them some friends—and in important ways, Aderholt's enemies helped him. Although he may not have appreciated it at the time, the slowness of his promotions made him unusually mature and experienced for his grade and helped ensure his success at every level. His real talent was for personal leadership, and lower rank gave him the chance to demonstrate this in a number of smaller units. He might not have done well commanding a numbered air force and certainly was not suited to life on the Air Staff. His relatively low rank also opened assignment possibilities for him that would not have been available if he had been promoted faster. Junior officers need to be reminded that *low* rank also has its privileges and opportunities, if they follow Aderholt's example and take full advantage of them.

**Tom Searle**
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**Duty: A Father, His Son, and the Man Who Won the War** by Bob Greene. HarperCollins Publishers, Inc. (http://www.harpercollins.com/hc), 10 East 53d Street, New York, New York 10022, 2000, 296 pages, $25.00.

The word *touching* best describes Bob Greene's *Duty: A Father, His Son, and the Man Who Won the War.* Greene, *Chicago Tribune* and *Life* magazine columnist, writes a true-life story about his relationship with his father, his interactions with *Enola Gay* pilot Paul Tibbets, and the great World War II generation that is now growing old and beginning to fade away. Written from the columnist's first-person accounts of his interviews with Tibbets and memories of his own father, the book speaks to past, present, and future generations. For young adults with whom the names *Paul Tibbets* and *Enola Gay* may not even register, the story provides educational insight and an appreciation for the men and women who lived through the depression and fought in the second great war. For the baby boomers, the book offers a refresher course in the importance of family and history, as they are reminded of their adolescent post–World War II years. Older generations will appreciate this book's reminiscences of the war years. Greene relays the accounts of his father, who recorded memories of his war experience on audiotape, and of Tibbets, with whom he spent countless hours discussing not only the flight of *Enola Gay* but also the details of wartime life and the ideals of the war generation.

Greene begins the story during the twilight of his father's life. Recalling from an earlier conversation with the elder Greene that "the man who won the war" lives nearby, the author decides to try to meet the great war hero Paul Tibbets. The death of Greene's father and the conversations he has with Tibbets ignite a strong curiosity in the author's mind concerning his father's youth and the war years. During World War II, the elder Greene

had been an officer who fought on the Italian front near the war's end. Although he knew that his father and the pilot who dropped the bomb on Hiroshima had never met, Greene saw a connection between them. He directs his discussions with Tibbets during the months following the death of Greene Sr. so as to gain a better understanding of the life and characteristics of his father. As a result, Greene's book offers insights into father-son relationships while praising the war generation and its heroes.

Although debates over the morality and necessity of dropping the first atom bombs will continue throughout history, Greene makes a strong emotional and rational argument in favor of the decision. In this story, Greene relays the accounts of Americans and Japanese alike who saw the necessity of the bombing. Although theoretical arguments concerning the ethics of letting loose such a horrible weapon of mass destruction are oftentimes strong and persuasive, the eyewitness accounts of Tibbets and his crew, as well as the thoughts of others who lived through the war, are provocative and shed new light on the argument. *Duty* offers valuable insight to anyone considering the morality and/or necessity of Hiroshima and Nagasaki by providing a unique perspective of the dilemma.

Although Greene may become too sentimental—almost melodramatic—in some segments of the story, overall I tend to believe that he represents his father's generation appropriately. The story is not intended to be a deep, scholarly historical account of World War II; instead, it is a collection of thoughts and insights concerning two men, their families, and their generation (not to mention the fact that it is easy to read and hard to put down). Tibbets and Greene Sr. represent a generation we must not forget. They represent what Tom Brokaw calls "the greatest generation."

**Cadet 1st Class Rob Reinebach, USAF**
*USAF Academy, Colorado*

**Stalin's Aviation Gulag: A Memoir of Andrei Tupolev and the Purge Era** by Leonid Lvovich Kerber, edited by Von Hardesty. Smithsonian Institution Press (http://www.si.edu/sipress), 470 L'Enfant Plaza, Suite 7100, Washington, D.C. 20560, 1996, 464 pages, $45.00.

On the evening of 21 October 1937, four agents of the NKVD (the KGB's precursor) entered the offices of Andrei Nikolayevich Tupolev and arrested him. Tupolev, the principal figure in the early development of Soviet aviation and a leading aircraft designer, was led away to immediate imprisonment. With this reprise of a scene played thousands of times during the Stalin era began one of the most bizarre (and telling) episodes of Soviet history. For Tupolev found himself not in the cells of Lefortovo or Butyrka prisons but locked away with hundreds of other aviation specialists and ordered to carry on his aircraft-design work. Like most of the NKVD's deeds, the tale of the prison workshops remained unknown and may never have seen the light of day if not for Leonid Kerber and his book *Stalin's Aviation Gulag*. This fascinating story is all the more compelling since it is based on Kerber's own imprisonment with Tupolev and on the long professional and personal relationship that followed.

*Stalin's Aviation Gulag* relates how Kerber, Tupolev, and hundreds of other aviation specialists were arrested and forced to work in three NKVD-run prison workshops (*sharaga* in Russian). Tupolev and his design team were imprisoned, along with the Petlyakov and Myasischev design teams, in the buildings Tupolev had worked in prior to his arrest—later to become the Tupolev Design Bureau. There the men lived and worked, isolated from their families and allowed outside only in the "monkey cage"—a rooftop enclosure of steel bars. Once, when the aircraft of a *sharaga* design team flew over Red Square in a May Day parade, the jailed designers were permitted to view the fruits of their labor from the monkey cage. Kerber paints the entire grim picture with similar vignettes: *sharaga* colleagues who disappear in the night, summonses to NKVD headquarters for interrogation on design projects, and books inscribed with the names of known purge victims appearing in the prison library. Tupolev, Kerber, and most of their design team somehow survived and even managed to design and fly a plane, the TU-2 bomber, under these horrendous conditions. Then, in 1943, they were released as abruptly as they had been arrested.

Like millions of others swept up in Stalin's purges, the *sharaga* interns had been arrested on false charges. Kerber devotes little attention to the question of why the *sharaga* inmates were arrested, seeming to treat as a given that any charges were trumped-up. He does write, incorrectly, that Tupolev was accused of selling Soviet aircraft designs to Germany. Actually, records released in 1997 from the KGB archives show that the charges against Tupolev were even more serious. The documents

indicate that in 1940, three years after his arrest, Tupolev was found guilty by the Military Collegium of the Soviet Supreme Court of "having led a harmful anti-Soviet organization within the Soviet aviation industry and, personally and through his agents, conducted harmful sabotage with the aim of weakening the Soviet Union's defense capabilities. Additionally, Tupolev has been an agent of French intelligence since 1924 and . . . has turned over Soviet secrets to French intelligence."

Whatever charges were cooked up, Kerber underscores the absurdity of Tupolev's arrest and the caprice and cruelty of the regime that created the prison workshops by setting the tale of the *sharaga* within the full context of Tupolev's life. Despite its title, Kerber's book is more a Tupolev biography than a tale of the Gulag. Kerber recounts Tupolev's central role in Soviet aviation before and after his imprisonment, beginning with his effort to establish the Central Aerohydrodynamic Institute (TsAGI)—the Soviet Union's leading aviation research and development center—his prescient advocacy of the transition from wood to metal aircraft construction, and his leadership in the advancement of Soviet bomber and transport aviation. The book also highlights some of the unique influences on Soviet aviation. Kerber's description of Tupolev's efforts to circumvent Communist Party doctrine against computers ("a pseudo-science . . . to be closed and forgotten, now and forever!") is just one example. In short, the story of Tupolev's life is the story of Soviet aviation from its prerevolutionary beginnings to the early seventies, and *Stalin's Aviation Gulag* is an important source on both scores.

Despite the seriousness of its topic, the book is refreshingly lively reading. Its anecdotal and frank tone is probably due to Kerber's having originally written it as *samizdat*—underground material to be passed from hand to hand within a trusted circle. In a real break from the standard Soviet practice of biography as hagiography, Kerber presents Tupolev, warts and all, describing his demanding, often rude, nature and his temperamental outbursts. Kerber even alludes to Tupolev's "resorting to strong Russian words to help his audience understand." Those who knew Tupolev personally have been blunter in talking to the reviewer, saying that Tupolev, in whatever mood, could hardly utter a sentence without resorting to the *mat* words—the foulest Russian jargon.

Kerber falls short on only one score. Among the most interesting episodes in Tupolev's long career, in terms of outside influences on Soviet aviation, were two extended trips he made to the United States. He first traveled here in December–January of 1929–30 as a member of a delegation that had as its main goal the purchase of aircraft engines to try to make up the Soviet lag in this area. Kerber makes brief mention of this trip and of Tupolev's impressions. However, he completely omits Tupolev's second visit to US aviation centers in 1935, a serious omission for several reasons. First, the 1935 trip was the more significant of the two—Tupolev was the delegation head this time and spent a total of 105 days touring the United States. Second, the trip had a much greater emphasis on observing US aviation design and development capabilities than the more commercially oriented first trip. Tupolev was especially impressed by a visit to the National Advisory Committee for Aeronautics and Langley Field. Finally, Tupolev had his original US trip as a baseline for his 1935 trip, and his observations regarding strides in world aviation and the comparative development of Soviet aviation would be historically significant. In fact, Tupolev's accounts of the 1935 trip, found in Russian aviation archives and a handful of Soviet-era publications, hint at his sense that Soviet aviation had begun to lag since his first visit to America when "Stalin's Falcons" were regularly setting world records. He noted that monoplane designs had almost completely supplanted biplanes in the West by 1935 and hinted that, although the Soviet Union was holding its own in large planes, it lagged in small-plane design. The drubbing that Soviet fighters, including the I-15 biplane and the underpowered I-16 monoplane, took in Spain from 1936 to 1939 bore him out. Unfortunately, available accounts are circumspect in their opinions, and Tupolev was obviously trying not to offend with overly frank comments. It is hard to imagine that Kerber was unaware of the 1935 trip or its significance, and, considering the frankness of the rest of his book, his silence on it is frustrating and confusing.

Nevertheless, *Stalin's Aviation Gulag* stands both as an important contribution to the history of the Stalin era and as a significant biography of one of the key figures in the development of Soviet aviation. Perhaps most importantly, the author has thwarted an effort to subvert history. Although Tupolev was officially rehabilitated in 1956, the Soviet regime never intended the story of his imprisonment or of the *sharaga* to be told. According to one researcher who reviewed Tupolev's files in the KGB archives, the rehabilitation committee required Tupolev to sign a lifetime nondisclosure

agreement. When he died in 1972, the phrase *neobosnovanno repressirovan* ("groundlessly repressed") would have looked out of place among the many official honors listed in his obituary, so it was omitted. If Leonid Kerber had not dared to put the whole story on paper, the monkey cage, which stands on the roof of the Tupolev Design Bureau to this day, might have remained the only evidence of the *sharaga*. Kerber has done a service both to his old friend and to history by telling the truth behind that strange monument.

**Maj David R. Johnson, USAF**
*US Defense Attaché Office*
*Moscow, Russia*

**Soaring above Setbacks: The Autobiography of Janet Harmon Bragg, African American Aviator** as told to Marjorie M. Kriz. Smithsonian Institution Press (http://www.si.edu/sipress), 470 L'Enfant Plaza, Suite 7100, Washington, D.C. 20560, 1996, 120 pages, $12.95.

In 1934 Janet Harmon Bragg became the first African-American woman to earn a commercial pilot's license. Her autobiography, *Soaring above Setbacks*, describes more than her accomplishments as an aviator, however. It tells of one woman's efforts to launch an African-American flying program and to raise social awareness of Black aviation. Aptly titled, this book, which is part of the Smithsonian History of Aviation Series, contributes to the understanding of the social environment facing a pilot who overcame discrimination as both an African-American and a woman.

Segregation is perhaps one of the greatest setbacks Bragg surmounted in her flying career. For example, African-Americans were generally banned from airports that served white flyers. Having formed the Challenger Aero Club, consisting of Bragg's instructors and classmates from an all-Black flying school, the members realized they would have to build their own airport on the outskirts of Chicago if they wanted to fly. Fueled by a vision to launch an African-American flying program, the members flattened coal cinders for a runway and built a hangar from scrap wood. Bragg bought a 2,100 lb red biplane with a Curtiss OX-S 90-horsepower engine for $500. As they flew around the United States encouraging fellow African-Americans to start an aviation career, the club took off—literally and figuratively—from its modest beginnings at this ramshackle airport.

What other forms of discrimination did Bragg face as an aviator? She was refused admission into the Women's Auxiliary Service Pilots because she was Black. Along with other African-American aviators, she was denied entrance into the Civilian Pilot Training Program, a government training course that offered advanced flying degrees and certificates for civilians in 1939. Furthermore, a check pilot once failed her after she had successfully met the requirements, stating that "she gave me a good flight. I will put her up against any of your flight instructors. But I've never given a colored girl a commercial license, and I don't intend to now" (p. 51).

*Soaring above Setbacks* is not a litany of complaints against discrimination; it is the story of one life told in a colloquial, conversational manner. Although the text is easy to read, the style lacks sophistication in places, marring the autobiography considerably.

If readers can overlook dialogue framed by "he said/she said" bookends and a chronological retelling that occasionally limps along, they will discover a woman who is assertive and independent. *Soaring above Setbacks* offers a glimpse into Bragg's character: she matures into a community-oriented individual who is proud of her heritage and interested in creating opportunities in aviation for others like her. In addition, the book provides insight into the social environment in which African-American and female aviators operated. If you want to be inspired by one pilot's life story, read Janet Harmon Bragg's book.

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**Most Secret and Confidential: Intelligence in the Age of Nelson** by Steven E. Maffeo. Naval Institute Press (http://www.usni.org), 2062 Generals Highway, Annapolis, Maryland 21401, 2000, 392 pages, $32.95.

Good military commanders appreciate the importance of intelligence to the success of their operations. Great military commanders work to ensure they actually *have* timely and accurate intelligence. One of history's great commanders was Horatio Nelson, and Steve Maffeo, himself an intelligence officer in the US Naval Reserve,

tells how Nelson gathered, analyzed, disseminated, and acted upon intelligence to help gain his victories.

After detailing how the British government, the Admiralty, and sea captains collected and analyzed intelligence, Maffeo looks closely at the sea campaigns of Copenhagen (1801) and the Nile (1798) to reveal how Nelson translated intelligence into operational practice. He concludes, convincingly if not surprisingly, that intelligence is a key to victory and that the commander's attitude and personal involvement in the entire intelligence process are crucial. Nelson was perhaps the best intelligence officer of his generation, and his ability to use this asset played no small part in his success.

Spies have existed for millennia because governments or military commanders have always needed to know the capabilities and intentions of a potential adversary. By the end of the eighteenth century, the bureaucracy established in England for gathering this information was both extensive and credible. Spies wandered foreign capitals and ports, watching, eavesdropping, and talking to the disaffected. In addition, Maffeo points out the important role played by agencies such as the National Post Office—which routinely opened, deciphered, copied, and then resealed foreign mail—and Lloyds of London and the East India Company, both of which were intimately involved in tracking military and commercial sea traffic around the globe. In addition, sea captains like Nelson were wise to expend significant resources in monitoring foreign movements. Maffeo is particularly good at detailing how frigates—a class of ship characterized by its moderate armament but high speed—served as the eyes, ears, and mouth of the fleet. Frigates plied the sea routes watching merchant vessels and sailed near or perhaps even into foreign ports to count ships, evaluate their sea worthiness, and test the response time of coastal defenses. They would then shuttle to and fro between the combat fleets and London, relaying information and directives. These activities were certainly neither foolproof nor rapid by modern standards. It often took months for a certain piece of information to be collected, reported, and then relayed to the appropriate commander at sea. Nonetheless, time is relative: although it may have taken the Royal Navy two months to produce useful military intelligence, it took the French, Spanish, and Dutch far longer-if they could conduct such intelligence operations at all.

I found one of the more enlightening discussions to be Maffeo's description of how sparse and small the typical commander's staff was and, therefore, how personality-dependent such intelligence operations were at the close of the eighteenth century. Nelson had a small table in his quarters on board his flagship and a single secretary to take dictation, translate foreign letters and newspapers, make copies, and file documents. In a very real sense, Nelson's intelligence function resided in his own brilliant mind. As the author phrases it, "Truly, the captain (admiral) had to be jack of all trades and, in reality, master of all as well" (p. 122).

As a good book often does, this one leaves us with questions that need to be further addressed and clarified. Maffeo shows how intelligence was gathered and analyzed, but the focus here is on *operational* intelligence. Nelson needed to know the location of the French fleet, its intentions, the quality of its personnel, the capabilities of its cannon, and so forth. He acquired and used this knowledge admirably in the major victories of his career. But in a broader sense, we need to know the objective of British naval strategy. England was a maritime nation that depended absolutely on its global trade. In turn, the Royal Navy sought both to protect that trade and to disrupt the enemy's. How did it know if it had succeeded? How many merchant ships did it take to fuel the British economy? How many French, Spanish, and Dutch ships had to be captured or sunk to significantly weaken their economies? How long would it take for a blockade to break the will of a government or a population? These are important but difficult questions to answer. The effects of sea power are not always obvious or easily measured. After all, despite the greatness of Nelson's victory at Trafalgar in 1803, the war against France burned on for another 12 years. Indeed, Napoléon's greatest victories and the zenith of his power occurred several years after Trafalgar. One must therefore be excused for asking how important such naval victories actually were to the overall war effort. In short, how can we measure the effectiveness of sea strategy? These are important questions every bit as relevant today as they were two centuries ago. Perhaps they will be the subject of Steve Maffeo's next book.

Although the author may rely a bit too heavily on the fictional accounts of C. S. Forester and Patrick O'Brian to illustrate his points, *Most Secret and Confidential* is a fascinating and rewarding account that would be useful to military officers of all ranks and services.

**Phillip S. Meilinger**
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**The Quest: Haywood Hansell and American Strategic Bombing in World War II** by Charles Griffith. Air University Press (http://www.au.af.mil/au/oas/aupress), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-6615, 1999, 226 pages.

Of all the "Great Captains of Airpower" produced by World War II, only one—Maj Gen Haywood Hansell Jr.—is remembered more for a lone failure than for his many triumphs. Dismissed as commander of the Mariana Islands–based XXI Bomber Command in January 1945, Hansell is regarded by some historians as the man who bungled the initial bombing campaign against Japan, setting the stage for his replacement by the estimable Curtis LeMay.

Unfortunately, that simplistic summary does a grave disservice to a man who made incalculable contributions to the development of airpower and the United States Air Force. Half a century later, many analysts have forgotten Hansell's instrumental role in creating Air War Plans Division—Plan 1, the blueprint for American aircraft production and employment during World War II; his pioneering work in establishing the Army Air Corps's first intelligence division; his dauntless leadership of two bombardment wings in the European theater; and (finally) his herculean efforts in getting the B-29 into combat. Such achievements clearly dwarf Hansell's setback at XXI Bomber Command, dictating the need for a more detailed—and balanced—account of his life and career.

Fortunately, military historian Charles Griffith has satisfied this requirement with *The Quest*, a comprehensive, independent assessment of General Hansell's varied roles as Air Corps officer, campaign planner, combat leader, and airpower visionary. In fewer than 230 pages of text and footnotes, Dr. Griffith does an admirable job of tracing his subject's evolution from daredevil pursuit pilot (Hansell was an original member of Claire Chennault's pioneering aerial-demonstration team in the 1930s), to wartime bomber commander, to tireless airpower advocate (in retirement) whose writings and speeches influenced future generations of air strategists.

Carefully researched and written, *The Quest* offers a fascinating portrait of a complex man. The Haywood Hansell who emerges in Griffith's book is a study in contrasts: a man who combined an engineer's rational mind with an incurable romantic streak, and a key member of Hap Arnold's inner circle who, nonetheless, remained something of an outsider to the very end. Gen Ira Eaker considered Hansell "nervous" and "high-strung." Gen Barney Giles, Arnold's deputy, regarded General Hansell as a "brilliant staff officer" but fought against his selection as leader of XXI Bomber Command, opining that Hansell was "not a tactical commander." Griffith's passages highlight the sometimes tense relationships within the Air Corps hierarchy and suggest the need for a separate volume on Arnold's staff, along the lines of Douglas Southall Freeman's *Lee's Lieutenants*.

Against this backdrop, Dr. Griffith traces the climactic battles of General Hansell's career as he struggled to launch the B-29 campaign against Japan. In retrospect, as the author reminds us, Haywood Hansell faced a virtually impossible task, trying to implement a strategic bombing campaign with green crews and untested aircraft against enemy targets more than a thousand miles away. Factor in maintenance problems, logistics nightmares, and a unique command relationship (Hansell reported directly to the always-impatient Hap Arnold), and the reader soon discovers that the seeds of Hansell's dismissal were sown almost from the moment he took command of the fledgling B-29 force.

Although Griffith does a solid job of recounting General Hansell's triumphs and tragedies, *The Quest* still falls short in several areas. First, the book never fully explores the mercurial relationship between "Possum" Hansell and General Arnold, the man who served as both patron and executioner during his subordinate's career. Hansell's dismissal in the Pacific came less than two years after Arnold lobbied personally for his return to the Air Corps staff. Was General Hansell merely a scapegoat for early difficulties in the B-29 campaign, or did General Arnold secretly share the view that Hansell wasn't up to the rigors of command? Dr. Griffith lays much of the blame for Hansell's firing on officers who had Arnold's ear (Gen Willis Hale, Gen Lauris Norstad, and Col Emmett "Rosie" O'Donnell), but a better analysis of the Arnold-Hansell relationship would explain why General Arnold sacked a commander who previously enjoyed his full confidence.

Additionally, Griffith spends little time on Hansell's recall to active duty during the Korean War and his subsequent promotion to major general. Since Hansell worked in the Pentagon's Military Assistance Program, we can only assume that he (again) crossed paths with former colleagues and rivals, yet there is no real assessment of how past events affected his "second" career in the in-

dependent Air Force. Likewise, despite having interviewed the Hansell family and having access to their private collection of letters and memorabilia, Dr. Griffith offers no rationale for General Hansell's unusual decision to burn his personal correspondence. Instead, the reader is left wondering why General Hansell would make such a dramatic choice and what critical historical documents were lost in the process.

*The Quest* also suffers, in spots, from faulty illustrations. The single-tailed B-32 bomber pictured on page 97 is misidentified as a twin-tailed B-24 Liberator, an error that anyone with rudimentary knowledge of World War II aircraft should catch—and correct. A section on B-26 bomber operations during World War II is illustrated with a photo from the Korean War, depicting a B-26 in the distinctive black-paint scheme of the Far East Air Forces. Readers—and authors—clearly expect better from Air University Press.

Despite these flaws, *The Quest* remains an important work. Dr. Griffith succeeds in resurrecting Haywood Hansell from the shadows of airpower history, offering an insightful, balanced account of a man who played a seminal role in the formulation and execution of strategic bombing theory and operations. *The Quest* places General Hansell squarely in the pantheon of airpower heroes and cements his reputation as one of the "Great Captains" of his era.

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**Ally to Adversary: An Eyewitness Account of Iraq's Fall from Grace** by Rick Francona. Naval Institute Press, 118 Maryland Avenue, Annapolis, Maryland 21402-5035, 1999, 186 pages, $27.95.

If you have an interest in biographical accounts of the Gulf War, you might try searching for them on the Web—and be a little surprised at the variety that exists. Most readers are well aware of Gen Norman Schwarzkopf's *It Doesn't Take a Hero,* Gen Fred Franks and Tom Clancy's *Into the Storm,* Saudi prince Khaled bin Sultan's *Desert Warrior,* and perhaps a couple of other broader works. But you might not know about personal accounts by Gen Chuck Horner (with Tom Clancy), naval aviators, a British special forces agent, Kuwaiti refugees, a US helicopter commander, a US Marine lieutenant, a nurse, a defense correspondent, and now an Air Force intelligence officer. Dismissing the addition of *Ally to Adversary* to this wide group would be a mistake—especially for Air Force officers and students of warfare—for it offers both an engaging front-row account and a rich source of perspective not found elsewhere.

A career Air Force intelligence officer and Arabic linguist, Lt Col Rick Francona had assignments to Iraq during the Iran-Iraq war and as General Schwarzkopf's personal interpreter during the Gulf War. In those roles, he formed relationships with Iraqi military officers and worked with representatives of all the Arab partners in the coalition. More importantly, he briefed the military strategy for Schwarzkopf in Washington, Jordan, and to the Saudi king; later, he attended the controversial cease-fire negotiations. Finally, he had an intimate knowledge of US and coalition intelligence and played a direct role in efforts that are debated even today.

This is the type of book that can be read quickly, even in one sitting. Francona is articulate, and his prose grabs the reader with a personal flair and touch. He begins with background to the war: his experience in Iraq during the mid and late 1980s and the year leading up to Iraq's incursion into Kuwait. He then relates his experiences serving as an interpreter, working with the Saudis, seeing the coalition structure developed, and briefing the military strategies to US and Arab audiences. He spends most of his pages on wartime insights and experiences, from airpower planning and execution, to concerns with Israel and Scud hunting, to searches for captured newsmen, to the ground war and Safwan negotiations. He wraps up with observations about the aftermath and the author's participation in postwar Pentagon reporting.

Other than the broad insights one might gain, four areas make this book extremely valuable for the military reader. First is Francona's descriptions and accounts of the Arab perspective. He not only provides a more balanced view of the Iraqis' perception of the war, but also effectively outlines what many in the United States would find incomprehensible: incidents such as Saudi officers cheering in control centers upon hearing of Iraqi Scuds hitting Israel. People may have heard the aphorism "the enemy of my enemy is my friend," but Francona's anecdotes make it more understandable and a real aid to assimilating aspects of Arab culture. More importantly, the author's descriptions of Arab perspectives on Gulf events fill a critical gap in most of the Gulf War literature, which ignores or downplays the roles and viewpoints of our coalition partners.

A second contribution is the author's observations on two wide debates about personalities: Schwarzkopf versus Prince Khaled and Schwarzkopf versus his US commanders. Rather than providing mere opinion, Francona relates incidents that allow readers to draw their own conclusions about Schwarzkopf's infamous temper and the working relationship with Khaled and other members of the coalition. One such incident that is also found in both Schwarzkopf's and Khaled's books concerns an alleged suggestion by the Arabs for the main attack to come from Turkey; Francona provides recollections that support the US commander. As regards the coalition commander's working relationship with his own US subordinates, Francona is neither apologetic nor disrespectful—readers will probably be struck by the honest and realistic accounts of personality conflicts bounded by professional duties. Although he does not directly address the criticisms and clashes between Schwarzkopf and Franks that one finds in *Into the Storm,* Francona does a competent and thorough job exploring the air and ground war "balance." Clearly, in the author's view, the ground war was best described as the "mother of all prisoner roundups."

A third issue of critical interest to military readers is the Safwan negotiations. Historians would be remiss if they did not incorporate the two chapters devoted to these events into critical reviews of the war. Francona's history is personal—he was there—and very engaging. His command to the Iraqi general to "get out of the car, a- -h- - -" is a classic picture of what was going on. He also cuts through some controversies, from the confusion about whether the Safwan meetings were cease-fire talks or actual war-termination negotiations (they were supposed to be the former, in Schwarzkopf's view), to the Iraqis' ignorance of their own state of affairs (their representatives were stunned when presented with evidence of the destruction of their forces). He paints the decision to allow the Iraqis use of helicopters as more exploitation of a loophole than US ignorance or command errors. Typically, though, Francona details the events and allows readers to draw their own conclusions.

The fourth and final issue needs little description but should be emphasized: Francona is clearly an experienced intelligence officer and an airpower advocate. Intelligence officers will find in his account numerous anecdotes and substantial advice about how their discipline both makes mistakes and saves lives. Again, he is not an apologist, so pilots and commanders will also find a wealth of firsthand perspective about the strengths and weaknesses of US intelligence practice. Taken as a whole, the book highlights the interface between intelligence and airpower operations; moreover, Francona seems (rightfully) concerned that the United States may not be investing enough in the human-intelligence field to reap the benefits it can provide.

I should emphasize that *Ally to Adversary* is not a history of the Gulf War; nor is it an "I was there and won the war" account. It is a personal history of an intelligence officer active in many of the most critical events, one which greatly complements broader accounts of planning and execution or analyses of leadership and command. If you are interested in the Gulf War, it is more valuable than nine out of 10 of any of the personal accounts; if you are an Air Force officer or other professional, it provides extremely valuable insights on airpower, command, and intelligence. Read it for yourself, and see if you agree.

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*Columbus, Ohio*

**Airborne Laser: Bullets of Light** by Robert W. Duffner. Plenum Publishers (http://www.wkap.nl), 233 Spring Street, New York, New York 10013-1578, 1997, 398 pages, $34.95.

Before the Air Force even conceived of the airborne laser (ABL), Air Force personnel, contractors, and scientists worked at Kirtland AFB, New Mexico, to develop a laser capable of shooting down a missile. Robert Duffner's well-documented history mixes physics and personal accounts to trace the development of military lasers from 1958. The task, then as today, was to develop a weapon that could destroy a missile in flight. Doing so required not only a powerful laser but also a tracking mechanism to keep a beam focused on a rapidly moving object. All pieces of such a system were developed at Kirtland over a period of 30 years.

Following the proposal to develop the ABL, the next two decades were spent perfecting chemicals and optics that would make such a device possible. In 1969 Gen John Ryan, chief of staff of the Air Force, authorized an increase in funding and paved the way for feasibility demonstrations since the project showed promise. Hans Mark, secretary of the Air Force, and Harold Brown, secretary of defense, also backed the program.

After more development work, most components of a ground-based test-laser assembly were fitted into an NKC-135 airborne laser lab (ALL). A second KC-135 was modified to act as the diagnostic aircraft, which would receive telemetric data from the ALL and targets. In the event of an explosion from the pressurized chemicals the ALL used to conduct laser tests, the diagnostic aircraft would be able to determine what had happened. After the usual setbacks that accompany such high-technology tests, the ALL successfully shot down a variety of test items, such as an AIM-9 Sidewinder and a BQM-34 drone.

After its successes in 1983, the ALL continued to serve as a test bed for laser experiments. In 1984, however, the aircraft went into flyable storage at Kirtland and in 1988 was retired and flown to the Air Force Museum at Wright-Patterson AFB, Ohio. This successful program gave the Air Force its first-generation laser and pointer/tracker. Currently, the Air Force is working on its second-generation system—an ABL mounted in a 747-400F—which should enter the inventory in 2006.

Since *Airborne Laser* provides the best history of developments leading to the ABL, I highly recommend it to any Air Force officer or to anyone interested in laser applications. Well illustrated, this technological success story covers the entire developmental work on airborne lasers, problems encountered, and solutions reached—all in writing that nonscientists can understand.

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**The Collapse of the Soviet Military** by William E. Odom. Yale University Press (http://www.yale.edu/yup), P.O. Box 209040, New Haven, Connecticut 06520-9040, 1998, 544 pages, $37.50 (cloth).

William E. Odom, a retired Army general officer and noted scholar of Russian and Soviet affairs, presents a new and compelling book about how and why the Soviet military collapsed and the connection of that event to the collapse of the Soviet Union. In a succinct and readable style, Odom illustrates why the Soviet military, once the feared behemoth that threatened western Europe, expired alongside the Soviet Union and the Communist Party.

Odom's analytical approach differs from that of many others who came before him. He realizes that a study of any country's military must include the political and economic context and concludes that this is particularly important in the case of Russia and the Soviet Union. By examining the politics, economy, and military of both Russia and the Soviet Union, as well as their interrelationship, Odom draws sound conclusions about the nature of the Soviet military without running the risk of oversimplifying the problem by leaving out important information.

The author sets the stage for his explanation by providing the reader an understanding of the complicated organizational arrangements of the Soviet military, Communist Party, economy, and state. He does so by examining these issues separately in the opening chapters. Odom first explains how one can view Marxism as a theory of war and why Lenin found it compatible with the writings of Clausewitz. After that, he examines the Soviet military's organizational structure, its manpower policies, and military and industrial arrangements that evolved over time.

In the process, Odom stakes out his own position in a number of contentious areas. For example, he concludes that the Soviet Union's goals in the arms-control arena prior to the Gorbachev regime were not concerned with ensuring strategic stability between it and the West. Instead, those goals sought either to mitigate problems in the Soviet economic structure or to retain or increase a military advantage. This runs counter to the two prevailing schools of thought on this issue: Soviet senior leadership, if not the military leadership, accepted US conceptions of strategic stability and deterrence theory, or it never seriously entertained them. Odom acknowledges that many of his conclusions run counter to some of the conventional wisdom about understanding the Soviet military. Yet, his integrated approach and new evidence, based on archival findings and interviews with former senior officers in the Soviet military, lead him to these plausible conclusions.

In the end, Odom concludes that three structural variables—the desire for empire, the military, and the economy—have captured not only the Soviet Union, but also have driven the policies of tsarist Russia since the time of Peter the Great. Russia constantly aspired to empire. But it needed a large military to capture new territory, control it, and defend it. Providing for the military's ever increasing demands required the Russian economy to grow at a substantial rate. But tsarist fears of the introduction of Western, liberal, democratic ideas into the country drove it to a state-controlled econ-

omy, with all of its inefficiencies. Tsarist Russia bequeathed this heritage to the Soviet Union, and Odom asserts that these structural variables still influence post-Soviet Russia. In the end, Odom predicts that if the current Russian Federation drops its historical vision for empire, then it will need only a small military and thus will be better able to reform its economy. But if Moscow still seeks an empire, then Odom suggests that Russian economic and military inertia may force that country to continue down the road it has followed for centuries.

*The Collapse of the Soviet Military* provides a new and more in-depth understanding of one of the most important events of the twentieth century. I recommend it to readers interested in the Soviet military and the ways in which a nation's politics, economy, and military interrelate, as well as those with an interest in world affairs and the role that Russia will continue to play in that arena.

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**A War to Be Won: Fighting the Second World War** by Williamson Murray and Allan R. Millett. Belknap Press of Harvard University Press (http://www.hup.harvard.edu), 79 Garden Street, Cambridge, Massachusetts 02138, 2000, 736 pages, $35.00 (cloth).

Although six decades have passed since World War II began, the conflict still fascinates us and generates new books every year. With every new history published, we learn something new, gain a new interpretation, or reinforce conventional wisdom. In *A War to Be Won,* Williamson Murray—a senior fellow at the Institute of Defense Analysis—and Allan Millett—the General Raymond E. Mason Jr. Professor of Military History at Ohio State University—repeatedly stress that selecting a coherent strategy and sticking to it proved to be the proper course for defeating the evil that was fascism. Three themes dominate their new book. First, the Allies were better at the strategic level of war than at the operational and tactical levels (although they improved during the war), and the course of the strategic war determined the victor. Germany and Japan never achieved a clear understanding of how to fight a strategic war. Second, because both Germany and Japan were evil states that had to be destroyed, the Allies were justified in using all available means to accomplish this end. Finally, because the Western Allies in particular fought a smart strategic war, they laid the foundation for a free, peaceful, and democratic Europe that kept the Soviet Union in check until that nation's inevitable collapse.

At the outbreak of the war, the Axis powers possessed superb operational and tactical doctrines that allowed them to sweep through vast territories—witness Germany's destruction of Poland, Denmark, Norway, Holland, Belgium, France, Yugoslavia, and so forth. The Japanese similarly took advantage of the weakened European powers' position and the puny US defensive stance in the Philippines to rape and pillage their way through the Pacific and Southwest Asia. The weakness of the Axis lay at the strategic level. Germany's main goal, for instance, was the destruction of an opponent's armed forces through operational maneuver. This worked fine until Operation Barbarossa, the invasion of the Soviet Union. When Stalin refused to capitulate as expected and his armies rebounded, Hitler and his generals flailed about in search of a strategy, attempting ever more desperate ventures and urging their soldiers to ever more superhuman feats. Moreover, Hitler seemed to be the sole strategic planner for Germany. Unfortunately for Germany, he never seemed to look much beyond current crises. When Britain and the United States landed forces in North Africa in November 1942, Hitler rushed troops into Tunisia without considering whether he could supply them. He then divided command of those forces between Field Marshal Erwin Rommel and Gen Jürgen von Arnim. Conversely, the Allies unified command under Eisenhower and moved forward when supplies caught up with them by the spring of 1943. The Allies had the better strategy and in May 1943 defeated the Axis forces, capturing 275,000 troops—a disaster equal to Stalingrad. Germany's failure to understand strategy extended well beyond Hitler. Gen Erich von Manstein, arguably Germany's best operational commander, displayed his strategic acumen when he purchased an estate in East Prussia in October 1944—with the Soviet armies on the border!

Likewise, Japan failed to develop a world-war-winning strategy. The objective of the Japanese was to inflict as much pain on the United States as possible and establish a defensive perimeter quickly, pinning their hopes on American reluctance to incur casualties. Japanese strategists gave little thought to what they would do if the United States

sought revenge, except to die gloriously for their emperor.

The Allied nations did not always agree on military matters; Great Britain argued for a Mediterranean campaign, while the United States and Soviet Union clamored for a direct approach in Northwest Europe. More important than the fact that the various Allied nations disagreed is that they agreed on a Germany-first strategy. Caught off guard at the war's outbreak, each nation that survived the initial offensives rebounded and learned to apply its strengths against Axis weaknesses (what we now call asymmetrical war). The Soviets traded space and manpower for time while they perfected the techniques of operational maneuver. As the war progressed, they improved their intelligence and deception capabilities, time and again surprising the Germans with a major offensive. The Soviets, who seemingly enjoyed an endless supply of bodies to throw at their enemy, never matched the Germans on an equal basis—but with asymmetrical warfare, one doesn't fight equally.

The Western Allies applied their strengths against their enemies' weaknesses. Great Britain and the United States produced 380 percent more aircraft, 225 percent more tanks, 270 percent more artillery, and so forth. Of course, these weapons were useless if they could not be brought to bear against the Axis powers. The Allies' superior strategy bore fruit when they applied their overwhelming resources to win the U-boat war, so men and material could be moved to England; and then the air war, so those forces could invade Fortress Europe; and finally the ground war, which ultimately helped the Soviets destroy the Nazi regime.

Against Japan, the Allies employed superior maneuver and firepower to grind the enemy into submission. Once they gained air superiority, US and British Commonwealth soldiers starved, bombed, or—when they had to—attacked enemy positions. The results were depressingly predictable. The Japanese put up a heroic but inevitably futile defense, sustaining 100 percent casualties in most cases. Although some Japanese leaders were more successful in delaying the Allied advances (capturing Iwo Jima took nearly a month, rather than days, as predicted), their sacrifice was in vain. The bottom line, according to the authors, was that the Allies' strategy decided the outcome of their operations. It became a question of when—not if—the Allies would win.

Interestingly, the authors include a chapter on the contribution that strategic airpower made to the European war—a difficult task in an operations history. Air warfare is not like surface warfare. Although no maps depict the battles, the drama is no less real at 20,000 feet than at—or below—the surface. Further, because the air war lasted the entire war, any chapter about it disrupts the book's flow. The authors' dilemma lies in deciding where to include this chapter. Each section has its pros and cons. In this case, the authors placed their discussion of the air war after the turning point of Stalingrad and North Africa but prior to the cauldrons of the Soviet offensives of 1943 and D day. Although Murray and Millett present nothing new, they nicely package the efforts of the British and US airmen. Although the air war was brutal, the authors saw it as necessary to destroy an evil regime. They disagree with many bomber advocates that strategic bombing brought Germany to its knees, but they do agree that it contributed significantly to Germany's defeat. Bombing not only gained air superiority, plunged transportation networks into disorder, and crippled key industries, but also forced Germany to divert over 10,000 antiaircraft guns and half a million troops to defending against the air front. Neither advocates nor opponents of airpower, Millett and Murray provide a balanced view, concluding that "the Combined Bomber Offensive was essential to the defeat of Nazi Germany. It was not elegant, it was not humane, but it was effective."

Unfortunately, this otherwise excellent work suffers when it moves to the Pacific war. Specifically, the authors treat Gen Douglas MacArthur unfairly—not an easy thing to do. True, MacArthur probably panicked on 8 December—and he was paranoid, imperial, a publicity hound, and politically ambitious. Moreover, he often announced victory while his troops were still locked in mortal combat. But one could say the same of many senior Allied leaders—Field Marshal Bernard Montgomery and Gen George Patton come to mind, for example. Asserting that MacArthur was the least qualified man in the Pacific to command, that he had not led men into battle above brigade level, and that he had not attended professional military schools, the authors ignore the contributions he made to preparedness as Army chief of staff in the 1930s—not to mention his reforms at West Point in the 1920s.

Further, Murray and Millett condemn MacArthur's wartime operations, claiming that poor generalship marred virtually every campaign. For instance, they insist that the entire 6th Infantry Division had to rescue the 158th Regimental Com-

bat Team (RCT). In another example, a cavalry regiment invaded Los Negros, requiring intervention by the entire 1st Cavalry Division in order to head off "another Little Bighorn." These are damning indictments indeed—if they were true. But a quick look at other sources shows that these assertions are not quite valid. In the case of the 158th RCT, it indeed could not take its objective alone, as MacArthur originally thought, but it is not true that the 6th Infantry Division had to come to its rescue. And Los Negros? It was a risky operation—some would say audacious. Because MacArthur did not have sufficient landing craft to mount a larger operation, he sent in one regiment with scheduled reinforcements to follow. On the third day of the operation, the Japanese counterattacked, only to be destroyed by cavalry troopers. After that, the 1st Cavalry concentrated on mopping-up exercises—not on preventing another Little Bighorn.

The Central Pacific thrust, headed by the Navy, does not receive the same damning criticism. The authors chastise MacArthur for needless casualties but do not mention whether those suffered by the troops under Navy command were any less or more needless. They highlight the dizzyingly fast offensives in the Central Pacific but do not praise MacArthur in like manner for comparable gains in the New Guinea campaign. They do not comment on how flexible MacArthur was when he faced shortages of resources—both men and materiel—or on how he successfully used air, ground, and naval forces to isolate hundreds of thousands of enemy troops, thus bypassing strong points, outflanking the enemy, and shortening the war by innumerable months. The reader wonders why. No mention is made of whether the offensive through the Central Pacific was right or not. The authors do not discuss whether two separate offensives along two different axes wasted resources. Nor do they highlight the irony that the Navy, looking for a great Mahanian battle in the Central Pacific, found it only during MacArthur's return to the Philippines. Although many historians have questioned MacArthur's leadership during World War II, especially during the return to the Philippines, Millett and Murray fail to prove their case to this reader. In fact, MacArthur's highly respected biographer D. Clayton James has said that MacArthur "brilliantly exploited" his resources in New Guinea.

*A War to Be Won* also includes four appendices. Because the summary of how nations organize, equip, and employ their forces—found in three of those appendices—provides the foundation of the entire book, the reader would be well served to begin at the end. The fourth appendix, a bibliographic essay consisting mostly of references to official histories, many of which were published decades ago, is less helpful to the casual reader. Moreover, many of the official histories cited are difficult to locate, found only in university libraries—if there—and make for tedious reading. The authors include very few new works. Of more interest to the student of World War II is the chapter-oriented bibliography.

Millett and Murray sum up the entire book in the epilogue, challenging a recent assertion that the Allied cause was as evil as the Axis cause. Place, for example, the bombing of Hiroshima or Dresden against the raping of Nanking or Auschwitz. Which was more evil? The authors counter that these episodes cannot be compared. Japan and Germany almost destroyed civilization with their war, while the millions of people who fought against those fascist regimes stood against evil. In praise of these men and those who gave their all, Millett and Murray quote Thucydides: "Some of them, no doubt, had their faults; . . . they have blotted out evil with good, and done more service to the commonwealth than they ever did harm in their private lives."

**Maj James P. Gates, USAF**
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# Touch and Go

*In this new 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* APJ *staff member.*

**Battle of Britain (1998, $19.95)** and **12 O'Clock High: Bombing the Reich** (1999, $29.95). CD-ROMs from TalonSoft (http://www.talonsoft.com), 9900 Franklin Square Drive, Suite A, Baltimore, Maryland 21236. *Battle of Britain* requires a Pentium 133 processor with 32 MB of RAM; *12 O'Clock High* requires a Pentium 233 with 64 MB of RAM. Both need Windows 95/98 and a 4X CD-ROM drive.

*Battle of Britain* is a war game for the personal computer from noted designer Gary Grigsby. Players can command either the Royal Air Force (RAF) or the Luftwaffe in an air-superiority campaign based on the historical (1940) scenario or a hypothetical 1941 clash. The computer can provide an artificial enemy, or players can go against each other on the same computer or via E-mail. The program also provides an artificial staff to assist in selecting targets, planning missions, and so forth. The Luftwaffe wins (achieves preconditions deemed sufficient for Germany to launch the invasion of England) by destroying the RAF's fighter capability and/or by bombing strategic targets. The RAF wins by preventing a German victory.

Expanding on the original game system, *12 O'Clock High* simulates all or portions of the Combined Bomber Offensive. Depending on the scenario, players can command the Luftwaffe, all of the Allied air forces, just the RAF Bomber Command, or the US Eighth and Fifteenth Air Forces. The program measures Allied victory conditions against a formula that combines Luftwaffe attrition with bomb damage of industrial and urban targets. The Luftwaffe player wins by preventing an Allied victory. For detailed reviews of both war games, see the reviews section of *Aerospace Power Chronicles* at http://www.airpower.maxwell.af.mil.

**The Biographical Dictionary of World War II** by Mark M. Boatner III. Presidio Press (http://www.presidiopress.com), P.O. Box 1764, Novato, California 94948, 1996, 733 pages, $24.95 (paper).

Because one often wonders how authors go about making their selections for biographical dictionaries, Mark Boatner is to be commended for providing insight into his methodology (in an introduction and by providing a bibliography). Both the process (which selected about a thousand names, based on their frequency of occurrence in selected texts about World War II) and the general results seem reasonable. Some choices are rather interesting, however. For example, Guy Gibson rates two-thirds of a page, while Paul Tibbets isn't included—which may be indicative of the origin and types of texts used in the selection. The biographical sketches also seem uneven, in that some are factual accounts ending in 1945, while others assess the person's contributions or provide his or her postwar accomplishments. Billy Mitchell is another interesting case. Although he died in 1936, he rates a paragraph; curiously, though, the entry makes no real attempt to explain any impact he had on the war. These anomalies aside, *The Biographical Dictionary of World War II* is the most complete work of its kind, and readers interested in that war should find it a useful addition to their libraries.

**Panzer Campaigns 2: Normandy '44.** CD-ROM. HPS Simulations (http://hpssims.com), P.O. Box 3245, Santa Clara, California 95055-3245, May 2000, $39.95. Minimum system requirements: Windows 95/98, Pentium 133 processor, 32 MB of RAM, and 200 MB of hard-drive space.

*Normandy '44* is the follow-on to HPS's *Smolensk '41*, which the company released to some acclaim last year. Both are operational-level war games that

allow a player to command either Allied or German forces against a computer-controlled or human opponent. The program, which supports play via E-mail, local area networks, or the Internet, includes numerous scenarios, along with an editor. Documentation comes on the CD, and the program includes on-line help as well. For more details, see the review section of *Aerospace Power Chronicles* at http://www.airpower.maxwell.af.mil.

**Trust but Verify: Imagery Analysis in the Cold War** by David T. Lindgren. Naval Institute Press (http://www.usni.org), 2062 Generals Highway, Annapolis, Maryland 21401, 2000, 222 pages, $32.95.

David Lindgren has written both a comprehensive overview of platforms used by photo interpreters during the cold war and an account of how information from imagery analysis has affected US policy. The book also discusses the reorganization of the imagery intelligence community in Washington, D.C., after Operation Desert Storm but lacks any new and revealing details. Perhaps it would prove useful as an introductory reader on the subject.

**The EC-47 Experience** by James C. Wheeler. Swearingen Ink (http://www.digital-ink.org), 125 Porter Industrial Road, Clarksville, Arkansas 72830, 1999, 240 pages.

This book details the missions of 42 EC-47s that engaged in tactical signals-intelligence work in the Vietnam War and provides an eyewitness account of their low, risky flights over the jungles of Vietnam, Laos, and Cambodia. Flying from Tan San Nhut, Nha Trang, Pleiku, Vietnam, and later from air bases in Thailand, the 360th, 361st, and 362d Tactical Electronic Warfare Squadrons, together with the 6994th Security Squadron of the Security Service, created a new form of warfare. This collection of personal memoirs is a must for students of the Vietnam War.

**Strategic and Tactical Aerial Reconnaissance in the Near East** by Col Charles P. Wilson. Washington Institute for Near East Policy (http://www.washingtoninstitute.org), 1828 L Street NW, Suite 1050, Washington, D.C. 20036, 1999, 122 pages, $19.95.

Colonel Wilson provides an overview of the SR-71 and U-2 aircraft, as well as unmanned aerial vehicles; their ability to gather intelligence; and the military uses of such data. His book details the aerial-inspection regime established by the United States at the conclusion of the Yom Kippur War of 1973 among Egypt, Syria, and Israel and discusses how the United Nations inspection of Iraq was supposed to work until abrogated by Iraq after Operation Desert Strike in 1998. Wilson's compact analysis is applicable to other trouble spots in the world as well.

**Warplanes of the Future** by David Oliver and Mike Ryan. Salamander Books Limited (http://batsford.com/salamander.html), 9 Blenheim Court, Brewery Road, London N7 9NT, 2000, 176 pages, £20.00 (approximately $32.20).

*Warplanes of the Future* opens with fourth-generation fighters, such as the F-22 and Joint Strike Fighter, currently being designed and built and quickly moves to unmanned combat aerial vehicles of the future. A well-illustrated coffee-table book, it also covers new technology in the form of air-to-ground surveillance with the Royal Air Force's Astor project; the Russian wing-in-ground effect craft, also known as Caspian Sea monsters; micro unmanned vehicles; and helicopters. Despite its RAF slant, *Warplanes of the Future* is still a marvelous study of emerging aircraft technologies.

**F-86 Sabre Fighter-Bomber Units over Korea** by Warren Thompson. Osprey Publishing (http://www.osprey-publishing.co.uk), Elms Court, Chapel Way, Botley, Oxford OX2 9LP, United Kingdom, 1999, 128 pages, $19.95.

The best known American aircraft in the Korean War was the North American F-86 Sabre, which gained fame in its air-to-air triumphs over the MiG-15. Much less is known of the F-86F fighter-bombers that served well in the last months of the war in two US Air Force fighter-bomber units.

Warren Thompson, a prolific and talented historian/writer, has produced an attractive small book on this aircraft, these units, and their air and ground crews. Profusely illustrated with large color photographs, the book documents all aspects of the aircraft's service in this difficult and unglamorous role. The photos are clear and interesting, even if they become somewhat redundant after a while, and are accompanied by brief text, heavily laced with direct quotes from the crews, as well as descriptive captions. In addition, the book includes a two-page

cutaway drawing of the Sabre and a page of specifications and performance notes. Aviation enthusiasts will enjoy the superior illustrations, and for those who know little about this aircraft, the text and captions will be enlightening.

**Kenneth P. Werrell**
*Maxwell AFB, Alabama*

**MiG Alley.** CD-ROM. Empire Interactive (http://www.empire-us.com), 580 California, 16th Floor, San Francisco, California 94104, 1999, $24.95.

*MiG Alley* is a flight simulator for the personal computer that allows players to fly the F-86, F-84, F-80, F-51, or MiG-15 aircraft. At the basic level, players can plan and fly missions as part of historically simulated campaigns. Of more importance to *APJ* readers, a player can also act as the Far East Air Forces commander in a simulated 1951 campaign. For detailed accounts of this simulator, see the reviews section of *Aerospace Power Chronicles* at http://www.airpower.maxwell.af.mil.

**Tactics and the Experience of Battle in the Age of Napoleon** by Rory Muir. Yale University Press (http://www.yale.edu/yup), P.O. Box 209040, New Haven, Connecticut 06520-9040, 1998, 352 pages, $16.95 (paper).

Rory Muir, the author of *Britain and the Defeat of Napoleon, 1807–1815,* attempts to characterize how the battles of the Napoleonic Wars were actually fought. He makes excellent use of the available data, both anecdotal evidence and statistics, to produce a synthesis of the most probable battle experience. This allows him to assess the effectiveness of the period's combat arms (infantry, cavalry, and artillery) and tactics. For *APJ* readers, Muir's methodology and the lessons that can be drawn from its application, rather than any insight into two-hundred-year-old tactics, make this book valuable.

**F-51 Mustang Units over Korea** by Warren Thompson. Osprey Publishing (http://www.osprey-publishing.co.uk), Elms Court, Chapel Way, Botley, Oxford OX2 9LP, United Kingdom, 1999, 128 pages, $19.95.

The Mustang, the best performing Army Air Forces fighter of World War II, was brought out of retirement to fly and fight in Korea. The US Air Force had largely reequipped its fighter forces with jets, but their limited range and the short, rough airfields in Korea made them less suitable than prop-powered aircraft. The F-51 did well and capped off its distinguished career with honor.

*F-51 Mustang Units over Korea* is the first of several pictorial books on US aircraft in the Korean War in Osprey's "Frontline Colour" Series. All the illustrations are in color—many of them full or double page—and all are quite clear. Brief but serviceable text, much of which consists of anecdotes supplied by the air and ground crews, and rather complete captions support the photos, but the book contains neither footnotes nor bibliography. In brief, *F-51 Mustang Units over Korea* is a delight to the eye.

**Kenneth P. Werrell**
*Maxwell AFB, Alabama*

**Defeat in the West, 1943–1945,** vol. 6, Luftwaffe at War Series, by Mike Spick. Stackpole Books (http://www.stackpolebooks.com/Stackpole-books.storefront), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 1998, 72 pages, $13.95.

Well-known aviation author Mike Spick has added to the Luftwaffe at War Series published by Stackpole Books. *Defeat in the West* is yet another picture book chronicling the life and death of the Luftwaffe in World War II. Its 62 pages of pictures, eight of them in color, make this an interesting book for the collector or researcher of Luftwaffe aircraft. At only $13.95, it is a fairly good bargain.

Spick includes four interesting pages of commentary in addition to remarks pertaining to the photographs. Interesting facts about the defeat of the Luftwaffe fighter arm, especially during the first six months of 1944, could be eye opening for readers unfamiliar with this aspect of the air war. The quick synopsis of the air war over Europe in 1944 makes for interesting, albeit quick, reading. Overall, readers looking only for something that uncovers never-before-published facts about the Luftwaffe would probably be better off not buying this book. Collectors of this series, however, or readers interested in having a decent volume replete with pictures of Luftwaffe aircraft will definitely find that *Defeat in the West* complements their libraries.

**Maj Robert Tate, USAFR**
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***The Editor***

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