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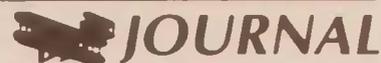


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A Word from the Chief

GEN MICHAEL E. RYAN, CHIEF OF STAFF

AEROSPACE POWER JOURNAL—a new name to reflect what the Air Force is all about. We are a visionary, powerful and integrated Air Force team, and this new title of our professional journal symbolizes that. It represents our vertical vector into the wild blue and our thrust for cutting-edge technologies and robust systems. Even more important than what is on the cover, the new name reflects what is on the inside—people across the continuum of aerospace operations contributing to an important dialogue.

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. It is a reality founded on the team effort between air and space systems and the people who operate, maintain, secure and support them. No longer can we afford to limit our planning, our organizing, and our developing of technology with compartmentalized thinking. We can and must maintain a seamless

unity of effort in these mediums to provide the unique vertical perspective that makes the Air Force what it is today and will be in the future.

Our aviation forefathers certainly did not limit their visions but established the Air Force on a journey we have extended into space and cyberspace. In the process, we have made these new frontiers fundamental to nearly everything we do—through integrated air and space communications, reconnaissance, defensive warning and myriad other functions.

Aerospace power provides an overwhelming and decisive edge over the enemy. It spurs us on toward new heights of speed, range, precision and agility. In every respect, the Air Force is defined by aerospace power, and so must we all internalize its fundamental meaning. Airmen often speak their own language, and that language for the next century and beyond is “aerospace power.”

The *Aerospace Power Journal* is here to develop that language and to advance important discussions about strategy, operational art, national defense, and how the Air Force can continue the outstanding team effort that makes us the world's finest aerospace force. We encourage you to join the dialogue; we look forward to your contributions. □



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 editor@cadre.maxwell.af.mil. We reserve the right to edit the material for overall length.

SPEAKING OF READING

I have been singularly disappointed in the recent compilation of recommendations for *Airpower Journal's* "The Mystique of Airpower: The Airpower Professional's Book Club." While I mean no disrespect to the titles that are on the list or to those who recommended them, the list appears to be quite narrow in its focus and lacking in the balance of readings one might expect for *airpower professionals*. Concentration on these books, while worthwhile, risks producing only a *technical specialist*. What of the *generalist*—the *leader*?

To me, *aerospace* professionals are those people who aspire to provide positive leadership to the nation as members of the United States Air Force, as well as those who support aerospace power as an arm of our national security forces. Therefore, I would offer that *breadth* of reading materials is equally as important as *depth* in the reading that such professionals do. This is particularly true today because of the critical importance of leadership in high-technology organizations, the complexity of the international environment, and the increase in joint operations that requires considerable leadership skill in addition to professional competence in the application of aerospace power.

That said, I would like to offer a different set of readings, a list that I have refined and updated since I began mentoring young officers *many* years ago—and that I continue today. This short list might be considered a

baseline for young professionals, as I could certainly add to the list for those who have been in the service of the nation for longer periods of time.

Col Dale O. Condit, USAF, Retired
Colorado Springs, Colorado

EDITOR'S NOTE: See this issue's "Net Assessment" section for Dr. Condit's reading list.

THE AIR FORCE MEMORIAL

We are the first of many students who will come to the Aerospace Basic Course (ABC). Along with the privilege of being the first class of the ABC curriculum, we were made aware that a certain responsibility fell upon our shoulders. We believe a part of that responsibility is to speak out if something is not representative of the true meaning of the word *airman*.

The other services have their memorials commemorating both pivotal and historic moments in each of their respective histories. These memorials are inspirational and reflective of the people who served this country, in their service, by putting themselves in harm's way. These memorials are true representations of the people who were able to accomplish feats, against all odds, to secure a better future for their posterity.

We would hope that a memorial erected for the men and women of the Air Force would also reflect our people, as the others do. We do not believe that some sort of symbolic representation or piece of modern art will instill in others a sense of our trials. It should represent every airman who has ever served, every airman who has ever been taken as a prisoner of war, every airman who is missing in action, every airman who has ever shed

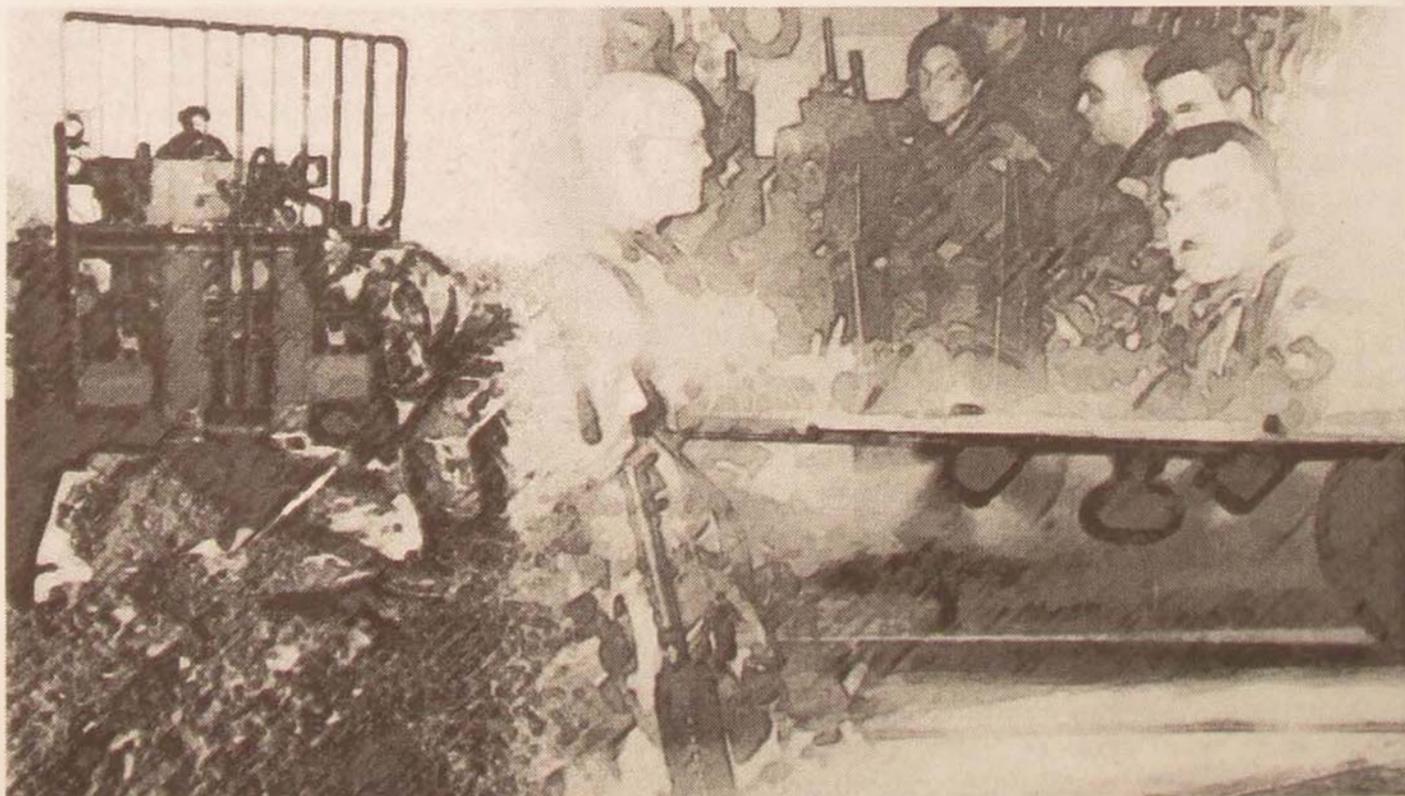
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Rapidly Deploying Aerospace Power

Lessons from Allied Force

GEN JOHN P. JUMPER, USAF

SINCE THE END of Operation Desert Storm, the US military has participated in 50 small-scale contingencies; the humanitarian relief effort for the 750,000 Kosovar Albanians displaced by Slobodan Milosevic is just one example. Because many of these contingency operations were without deliberate plans and without an infrastructure in place, aerospace forces have had to respond to this trend with changes in organization and technology. Previously, Air Force units have been committed through stovepipes: engineers, communicators, medics, airfield managers, security forces, airlift control elements, and so forth, often in advance of an established Joint Task Force (JTF) or even a Commander of Air Force Forces (COMAFFOR). While other services are tasked to deploy in recognizable units (a US Marine Expeditionary Unit or Marine Expeditionary Force, for example), Air Force units tend to be tasked by Unit Type Codes (UTC) or, in some cases, individual specialties. While we have demonstrated the ability to react quickly, we often outpace our own ability to set up appropriate command struc-



tures. In other cases, we hinder our ability to react quickly by requiring large and cumbersome survey teams, which can be as intimidating as the threat we are attempting to counter, especially to a small nation. We can do better than that.

To help aerospace forces take maximum advantage of that thing we do best in today's expeditionary world—get there rapidly—and to do it without having to smother host nations with survey teams, US Air Forces in Europe (USAFE) formed the 86th Contingency Response Group (CRG) as a test for the Air Force. Our chief of staff, Gen Mike Ryan, gave permission to create the unit just as events in Serbia were coming to a boil. This is the story of the 86th and of a handful of dedicated airmen who made a big difference for thousands of refugees and demonstrated the value of an organized “first in” capability to our Expeditionary Air Force.

Description of the Group

The 86th CRG is designed to be a multidisciplinary, cross-functional team whose mis-

sion is to provide the first on-scene Air Force forces trained to command, assess, and prepare a base for expeditionary aerospace forces. The cross-functional design under a single commander provides a unity of effort while also minimizing redundant taskings or personnel. This in turn allows the unit to be trained to task and ready to deploy rapidly—all with minimal equipment and personnel.

The group currently consists of 134 individuals, which makes it one of the smallest groups in the Air Force. It is divided into two squadrons—the 86th Air Mobility Squadron and the 786th Security Forces Squadron. More than 40 diverse specialties comprise these two squadrons, including security forces, communications, aerial port, Office of Special Investigations, medical, intelligence, command and control, fire support, supply, airfield management, information management, maintenance, civil engineering, vehicle maintenance, and health care. When deployed, this core can expand up to a five-hundred-person to two-thousand-person force, depending on the mission requirements to establish an expeditionary base for follow-on





Operating under the primitive airport conditions at Tirana, Albania, posed a constant challenge for the CRG.

forces. The expansion process relies on a three-tier system.

Tier One personnel are not assigned to the CRG but are "by-name" assigned as CRG augmentees. These Tier One personnel work closely with the CRG on a daily basis, exercise with the group, and are trained in CRG-specific operations and force-protection concepts. Specialties in which Tier One individuals work include weather, air traffic control, services, communications, civil engineering, finance, law, combat camera, fire protection, protocol, combat control, psychological operations, civil-military affairs, personnel accounting, ground and flight safety, explosive-ordnance disposal, biological/chemical warfare, fuel, mortuary affairs, and chaplain concerns.

To complement these Tier One personnel, the CRG has access to Tier Two personnel. As within Tier One, Tier Two personnel come from units that work regularly with the CRG; however, they are not specifically identified as CRG augmentees, nor are they identified "by-name." The final category consists of personnel within existing UTCs that provide the specialized capabilities available through normal training channels.

The three-tier process generates functional experts in various readiness levels who can support a mission philosophy of speed and precision. The 86th CRG was designed to get in within hours of its tasking, take control of airfield operations, establish security and communication, and quickly assess what additional capability would be required.

First Use and the Resulting Impact on JTF Shining Hope

The 86th CRG achieved initial operating capability on 20 March 1999; it was called into action less than two weeks later. Shortly after the air operations in Yugoslavia began on 24 March 1999, Slobodan Milosevic's forces increased their ethnic cleansing operations against the Kosovar Albanians. This in turn caused a massive exodus of refugees from Kosovo to both the former Yugoslavian Republic of Macedonia and Albania. While the various governmental and nongovernmental organizations responded to the deteriorating humanitarian crisis, they were overwhelmed, and by 1 April they requested help.

In response, the United States European Command formed a JTF with Maj Gen Bill Hinton, then the Third Air Force commander, as the JTF Shining Hope commander. General Hinton and key members of

Mere hours after landing, the CRG had established a secure base and began off-loading supplies. However, even though the group was unopposed, the pace of continuous operations proved difficult. For example, the heavy flow of arrivals and departures could be maintained only when the CRG assumed air traffic control for all Albanian airspace.

his staff met at Headquarters USAFE on 2 and 3 April to assess the situation and begin planning. They focused on Tirana, Albania, which would be the distribution center for humanitarian aid, and concluded that the lack of information about Tirana's airfield as well as the absence of a supporting infrastructure called for the 86th CRG. On 3 April, the 86th CRG deployed to Tirana, set up air base operations, and facilitated the reception of hun-





The need to defend expeditionary air bases may present unprecedented challenges. At a time when US airborne and orbital forces appear to be less and less susceptible to their enemies, forward basing will invite any and all forms of asymmetric attack.

dreds of aircraft responding to the desperate humanitarian situation caused by ethnic cleansing in Kosovo.

In the morning hours of Sunday, 4 April, three C-130s took off from Ramstein Air Base, Germany, bound for Tirana, carrying 38 members of the 86th CRG and their commander, Col Clifton Bray, who was also tasked to be the COMAFFOR. Within hours of landing, the CRG established a secure perimeter, set up the necessary communication capability, and began off-loading food and aid from C-17s. By day's end, the group had laid the foundation of a relief-delivery system that would be used by all who responded to the crisis. In the ensuing 58 days, the 86th CRG would manage and off-load humanitarian supplies from hundreds of airlift aircraft from France, Portugal, Germany, Italy, the Netherlands, Austria, Switzerland, Belgium, the

United Arab Emirates, Spain, and Russia. The CRG also provided the framework for the initial deployment of the US Air Force units and assisted other US services and multinational forces when they deployed into Tirana. The group provided initial on-scene support with communications, aerial port, and security for Task Force Hawk, Allied Mobile Force Land, the USS *Inchon*, the 26th Marine Expeditionary Unit, the Air Mobility Operations Group, RED HORSE, Seabees, and civil-military affairs.

One of the major obstacles for the relief operations was the inability of the Albanian air traffic control system to handle an air operation of this magnitude. Previously, the airfield had only 10 arrivals and departures per day. Within a few short weeks, under the 86th CRG's leadership, there were over four hundred takeoffs and landings per day. However,

by mid April, Tirana's airspace became so congested that humanitarian aircraft were being turned away. The Albanian authorities looked to NATO for help; NATO in turn looked to the US Air Force, specifically the CRG, to control Albania's airspace and Tirana's airport. Essentially, the CRG commander, Colonel Bray, became the "FAA director" for Albania. The CRG set up a radar approach control, a tower, and navigational aids, and within days, the pace of relief flights resumed.

In addition to setting up effective airfield operations, the CRG also provided the initial US military leadership in the daily Emergency Management Group that met in downtown Tirana. This group provided the senior leadership for directing the relief operation and consisted of representatives from all the participating countries and relief organizations, such as the United Nations High Commissioner for Refugees, the Organization for Security and Cooperation in Europe, the World Food Program, the World Health Program, and the International Red Cross. Additionally, all the nations contributing military forces sent their commanders to participate in the group. During the first week, the CRG assumed the lead role for the multinational military forces attending this meeting and briefed the group on the military actions taken each day. The CRG created a military working group that met after the Emergency Management Group and solved numerous problems associated with the start-up of military relief operations in Tirana. When NATO assumed control of the military relief operations in Albania, the CRG turned chairmanship of the military working group over to Albania Force personnel.

The CRG was a large reason the United States and its allies were able to achieve their goal: to provide the displaced Kosovar Albanians adequate shelter, food, and public health conditions until the political situation in Kosovo permitted their return. The ability of the CRG to rapidly establish a secure and effective air base and airspace in and around Tirana and to coordinate and assist all US



Airmen install drainage pipes along the main road leading to Tirana-Rinas Airport. They also repaired and enlarged the main road leading out of the airport.

and multinational organizations allowed it to successfully accomplish its mission—the care and feeding of the Kosovar Albanians. USAFE's employment of the 86th CRG in the Albanian crucible provided an opportunity to study and gather data needed to fine-tune the CRG as well as examine its utility for other theaters.

The Need for These Capabilities in All Theaters

The requirement for the CRG capability is not unique to USAFE; we believe this capability is fundamental to the entire Air Force. We cannot plan with certainty which bases our expeditionary forces will operate from, as we just proved in USAFE—a theater where unplanned contingencies have not been consid-

ered much of a threat. This inability to plan with certainty is a major impediment, preventing the Air Force from pre-positioning necessary equipment for expeditionary operations. Additionally, the rapid portion of expeditionary operations is based on deploying with enough equipment and personnel to begin operations immediately, rather than waiting for survey teams and tailored UTCs. Accurate information is crucial to accomplishing this—the CRG is central to gaining that information.

Because the CRG can arrive at an expeditionary airfield quickly, it can fill the initial information void faced by contingency planners in assessing and preparing a staging base for expeditionary aerospace forces. By making these assessments, the CRG is a key component not only of gaining entry to locations, but also of defining the follow-on forces' logistical requirements more precisely. The CRG is crucial to rapid deployment and employment.

The Way Ahead

The first step is to learn how to deal with success—the success of being needed or considered irreplaceable. The JTF deployed the 86th CRG into Tirana without a clear exit strategy or transition plan, and because of its success, we had a difficult time bringing the group home to prepare for the next contingency. Part of the concept is that the CRG is the “initial” presence and enables follow-on forces. As we develop the expeditionary concepts, our plan for follow-on forces must provide for rapid reconstitution of the CRG. The CRG is like our “silver bullet” to enable expeditionary operations, and it is critical that we are able to rapidly reload and fire it at new “targets.”

For example, when the Supreme Allied Commander Europe decided to deploy additional CONUS-based Air Force units into the

theater for Operation Allied Force, there were no more suitable airfields in Italy. USAFE planners had to explore airfields further away, and suitable airfields were found at Bandirma and Balikesir in northwestern Turkey. Although these airfields were inside NATO, other NATO nations were not prepared to operate from them. In this high-paced reinforcement of Operation Allied Force, the 86th CRG was unavailable to provide a real-time assessment of the two Turkish airfields to refine the flow of material and personnel from the 4th Fighter Wing at Seymour Johnson AFB, North Carolina.

Additionally, the CRG needs to be able to operate in scenarios across the spectrum of conflict. Tirana was an unopposed entry. The Air Force needs to work with the other services to enable the CRG to rapidly assume control of a base captured or secured by ground forces. We must be capable of defending this freshly seized expeditionary air base from both ground- and air-based threats. This will be a large transition from our standard security infrastructure. To defend an air base in such a demanding environment requires that we reexamine the CRG to determine if it is properly organized and trained. The Royal Air Force's Regiment provides us with a standard we should aim toward. The success of the CRG will rest upon its people—people who are as proficient at warrior skills as in their Air Force Specialty Codes.

The test of USAFE's 86th CRG was a resounding success and far surpassed our expectations toward enhancing expeditionary operations. We will continue to refine the composition, training, and doctrine for our CRG, and we will forward our recommendations for how Contingency Response Groups should be included in force packages that will make up our Expeditionary Aerospace Forces in the next century. □

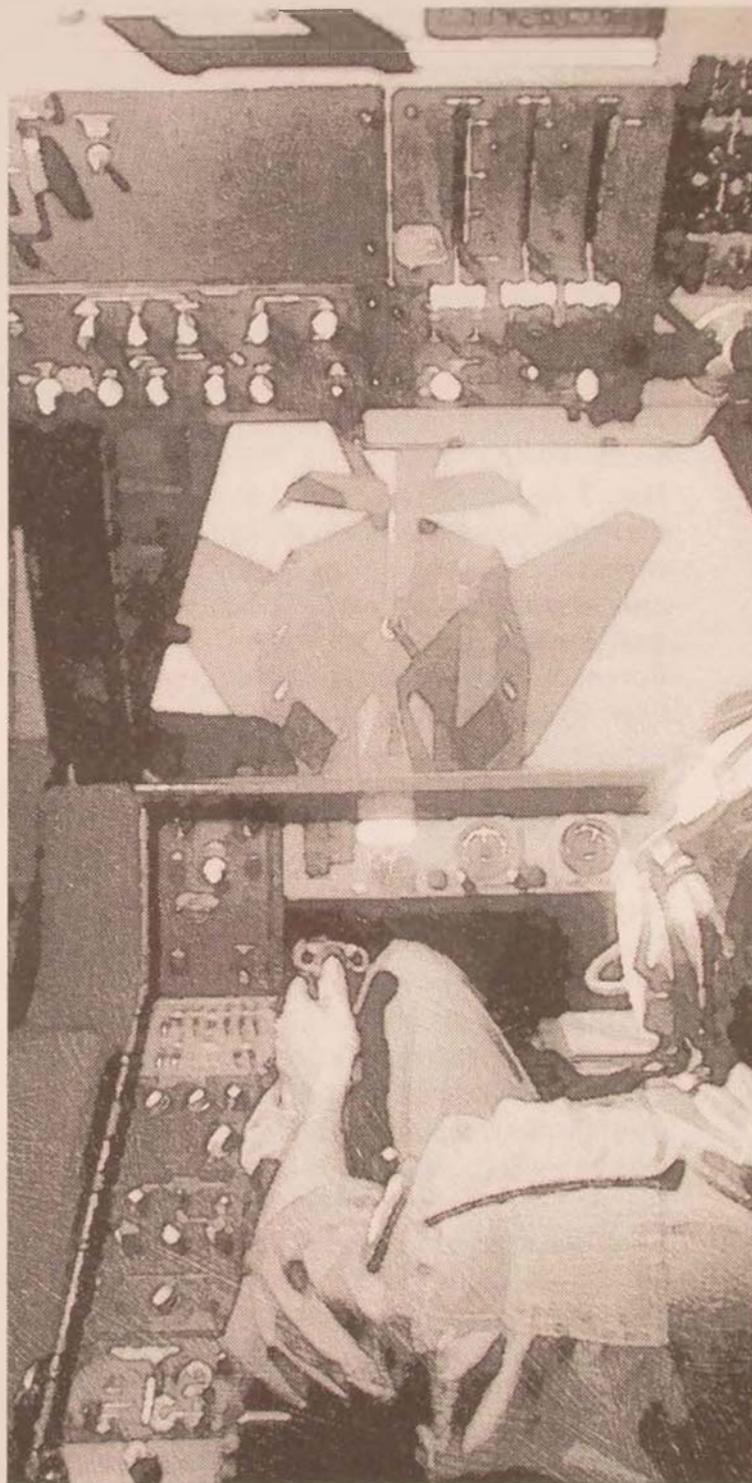
Kosovo and Theater Air Mobility

LT GEN WILLIAM J. BEGERT, USAF

TO THE SURPRISE of many, airpower played the deciding role in a major theater war. In Operation Allied Force, airpower forced Slobodan Milosevic to the bargaining table and convinced him to withdraw thousands of troops, police, and paramilitaries while letting an international peacekeeping force enter Kosovo. Remarkably, this was accomplished without the loss of a single NATO airman in combat, despite 78 days in which NATO aircrews faced a dangerous, well-equipped enemy. In this endeavor, the US Air Force contributed half of the total air assets and an even greater share of the air refueling, reconnaissance, and precision-weapon-capable aircraft. This successful display of airpower employed a percentage of today's smaller Air Force roughly equivalent to that required for Operation Desert Storm.

Air mobility played a crucial role by enabling and sustaining the air war that ultimately forced Milosevic to accede to NATO demands. This was no easy task. Unlike Desert Storm, the United States did not have six months to position its forces. Allied Force demanded a continuous air-mobility reinforcement and sustainment effort until the end of hostilities. From the beginning of the air war on 24 March 1999, the US Air Force contribution grew from three to 10 air expeditionary wings. Even while it executed this tremendous force buildup, the air-mobility team provided aid directly to thousands of Kosovar refugees, and it deployed a large US Army contingent to Albania.

Despite the challenges, the Kosovo air-mobility story is a happy one. The integrated effort between theater mobility forces and Air Mobility Command (AMC) produced one of



the smoothest air-mobility operations in Air Force history. AMC-tasked mobility forces bore the majority of the burden, expending nearly two-thirds of the total airlift effort to move US-based fighters, bombers, and support assets to the fight as well as providing munitions resupply and other sustainment. Likewise, AMC tankers delivered continental-US-based fighters to the theater, often while deploying themselves to join the Allied Force tanker fleet.

US Air Forces in Europe (USAFE) was responsible for intratheater air-mobility operations. In organizing and orchestrating theater air-mobility efforts, the command built upon lessons learned in past contingencies and put newly minted Air Force and air-mobility doctrine to the test. While we have much to celebrate, we still have plenty of room for improvement. Leaving the intertheater story for AMC to tell, I will review theater tanker and airlift efforts during the Kosovo contingencies. I also will describe the command and control structures and relationships implemented for theater air-mobility operations and identify some lessons learned along the way. Finally, I propose several steps the Air Force should take as it transitions to a more expeditionary force.

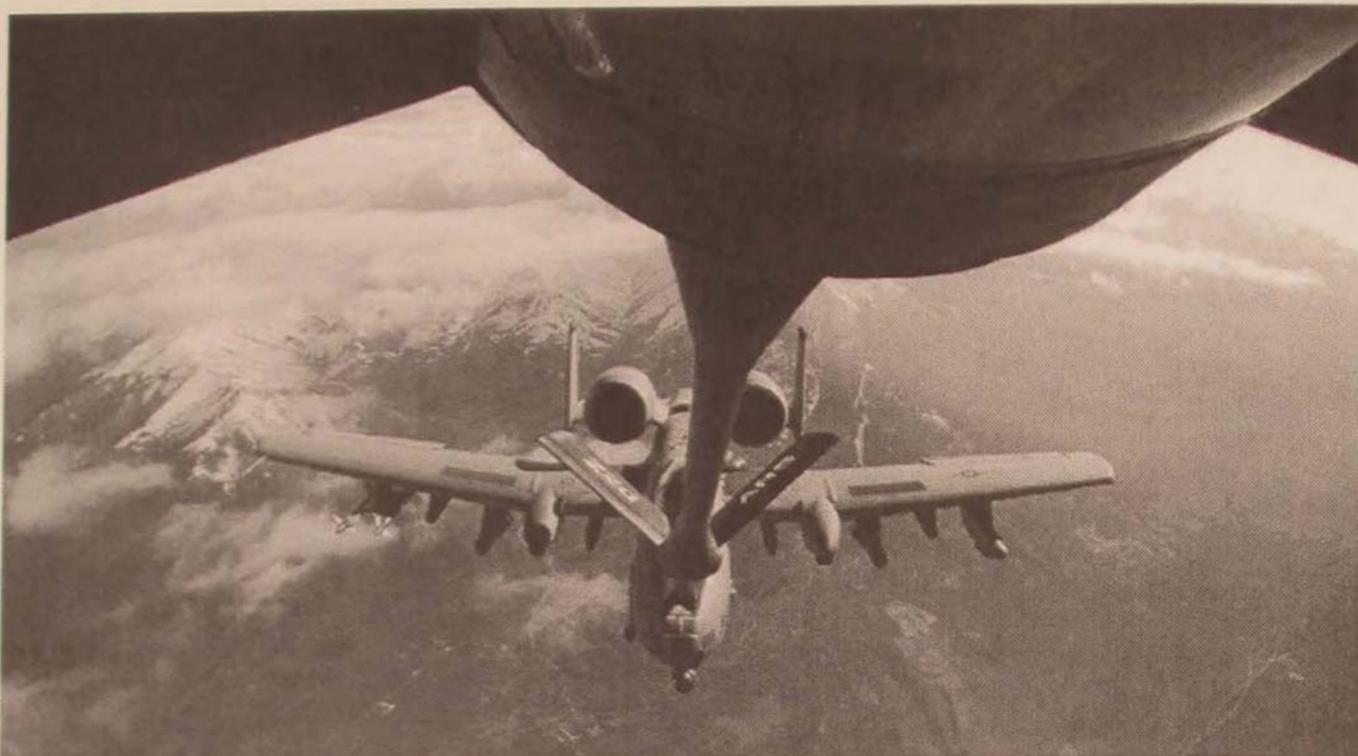
Tanker Operations

The US Air Force provided nearly 90 percent of the NATO tanker force. The total force of 112 active and 63 Reserve-component tankers flew over five thousand sorties to enable nearly 24,000 combat and combat-support sorties. Altogether, they supplied 250 million pounds of fuel and the lifeblood of the air war. Maintainers made the entire tanker effort a success by keeping the KC-135 and KC-10 fleet healthy. While their mission remained largely behind the scenes, the following examples show how tankers were at the heart of the fight. A KC-135 from RAF Mildenhall, United Kingdom, was within 70 miles of two MiG-29s when two F-15Cs shot down the Yugoslav fighters over Bosnian airspace. When an F-117 went down over Ser-

bian territory, more than 20 tankers kept a large search-and-rescue package airborne for over six hours until the pilot could be rescued.

While US tankers provided the backbone of the air campaign, finding operating locations for so many KC-135 and KC-10 aircraft was challenging. Between 24 March and 8 June, tanker beddown became a major issue for the theater as the force grew from 55 to 175. Because the ideal airfields reached maximum capacity early in the campaign, USAFE formed 13 site-survey teams to examine 25 airfields for both tanker and fighter operations. Many were former Warsaw Pact or NATO fighter bases that lacked the runway length, ramp space, taxiway width, load-bearing capacity, and refueling infrastructure to sustain tanker operations. While few of these airfields were optimal for tankers, USAFE added seven suitable locations to the five in use when the air war began. The smooth, uneventful flow of tankers to locations ranging from the international airport at Budapest, Hungary, to a French air base at Mont-de-Marsan set the standard for future expeditionary deployments.

There are several reasons why the US tanker force grew so large. As it became clear that the campaign would extend over several weeks or months, NATO initiated a major reinforcement. Each additional aircraft required for an ever-expanding war drove tanker numbers higher. Limitations caused by tanker basing decreased off-load capability and further increased the number of tankers required. The distance of some tanker locations from refueling areas meant less fuel available for off-load, since transit times of up to three hours were required in each direction. Short runways at several locations reduced available fuel off-loads even more by decreasing tanker takeoff fuel. With combat missions launched from as far away as the United Kingdom, fighter basing and transit times similarly increased fuel requirements and total tankers needed. Finally, political constraints impacted tanker requirements by closing the airspace of some countries to air refueling and dictating less direct, less fuel-

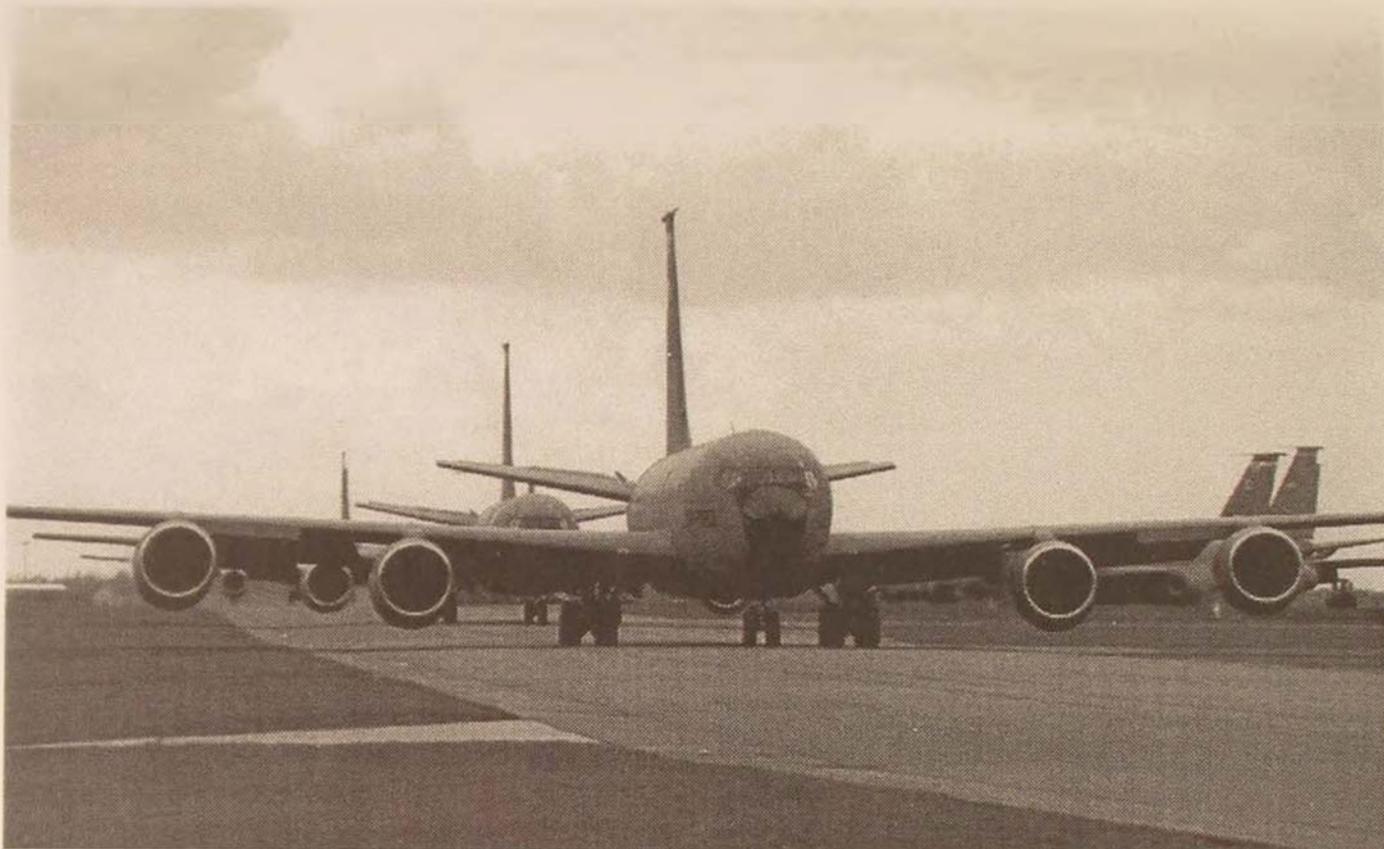


Views from KC-135s as they refuel an Air Force A-10 (above) and a German air force Panavia Tornado during Operation Allied Force. In addition to providing essential support across the Air Force spectrum of operations by refueling all types of USAF aircraft, these tankers supported US Navy, Marine Corps, and allied aircraft as well.



efficient routing for strike packages. While each of these factors increased the size of the tanker force, the emphasis of combat operations on mission effectiveness over efficiency also required a larger force than might otherwise have seemed necessary.

Unlike airlift, which must maximize efficiency because requirements often exceed available resources, combat-support air refueling places a premium on effectiveness. The Allied Force tanker plan had built-in redundancy, which ultimately enabled the air campaign to achieve its desired effects. For example, fully fueled KC-10s manned a reliability orbit for the duration of the air war with few or no scheduled receivers. While inefficient, these reliability tankers repeatedly saved the day—salvaging refuelings after scheduled tankers broke, recovering fighters that burned extra fuel to engage enemy aircraft, and providing unplanned fuel to permit in-flight target changes. Similarly, ground-alert tankers, while not efficient, saved countless missions as well, especially when bad weather demanded increased flexibility in refueling times and off-loads. Without the reliability KC-10s and ground-alert KC-135s, rescue ef-



KC-135 Stratotankers taxi for takeoff from RAF Mildenhall during Operation Allied Force. As the number of aircraft supporting Allied Force grew, the number and types of deployed locations expanded throughout Europe.

forts for two US pilots downed over Serbia would have been delayed by hours or even days, if not lost completely.

Finally, the tanker force was sized to provide an 80 percent maintenance-reliability rate, closely reflecting an actual KC-135 mission-capable rate of 78 percent and a KC-10 rate of 88 percent over the course of the air war. Unfortunately, the tanker force was not always fully utilized. During a campaign with only 21 days of favorable weather, nearly 20 percent of all strike missions, along with their supporting tankers, were cancelled due to poor weather. NATO targeting procedures caused some strikes to be cancelled on the day of the scheduled missions. In addition, tankers were sometimes airborne when receiver packages were cancelled for bad weather or target cancellation, and they often had to dump fuel to land.

In the final analysis, tanker requirements had to be based upon the most promising

conditions; otherwise, they would have come up short on favorable days. Undoubtedly, the Allied Force tanker plan could have been better. In the heat of a daily expanding air war, however, the search for greater efficiency took a backseat to the paramount need for mission effectiveness. Given the nature of the air campaign and the many obstacles tankers had to overcome, their accomplishments were remarkable.

Airlift and Air-Mobility Support

If tankers provided the backbone of the air war, airlift put its elements into place and sustained it until the end. Not only did the air-mobility team increase theater forces from three to 10 expeditionary wings in 78 days, it had to conduct a major humanitarian-relief operation and deploy the large US Army Apache helicopter contingent at the same time. Just as the star of the air war was the B-2,

the C-17 stole the air-mobility show. Flying up to 22 daily sorties with only 12 airframes under USAFE's tactical control (TACON), the C-17 exceeded all expectations and supplied departure-reliability rates above peacetime averages. The much older C-130 force of USAFE-assigned and attached assets provided equally impressive rates. Like the tanker contingent, the C-130 team reflected the total force with a mix of active and Reserve-component crews and 31 aircraft at the peak of operations. Airlift crews flew demanding missions in airspace heavily crowded by combat and support aircraft, and as a testament to their airmanship and professionalism, they did so without major incident.

Prior to the air campaign, USAFE pre-positioned 64 fighters from air bases in Lakenheath, England, and Spangdahlem, Germany, to Aviano and Cervia, Italy, and these were joined by 18 A-10s deploying to Gioia del Colle, Italy, early in the war. Flying 78 missions, C-130s from Ramstein Air Base, Germany, moved 734 passengers and 630 short tons of cargo to support this fighter movement. The fighter-deployment bill could have been much higher, but it was reduced by an important lesson USAFE learned from the autumn 1998 dry run for Kosovo. Rather than deploying with the standard 30-day War Readiness Spares Kit, USAFE units brought only the equipment and supplies needed for an initial five to seven days. While the deployment could have been even lighter and leaner, this departure from the traditional way of thinking set the standard for the Expeditionary Air Force.

When the initial phase of the air campaign plan did not meet NATO's desired objectives in Kosovo, AMC and theater air-mobility forces aided the reinforcement of US Air Force assets already in place. At the same time, US Army Europe (USAREUR) was tasked to deploy 24 Apache helicopters to Tirana-Rinas Airport in Albania. Designated Task Force Hawk, this force required 468 C-17 and 269 C-130 missions to move a support and force-protection package that included 36 M1 Abrams tanks and 58 M2 Bradley fight-

ing vehicles. At Tirana, these aircraft were unloaded by an AMC Tanker Airlift Control Element (TALCE) under USAFE TACON. Together, the airlift and TALCE team delivered 7,745 passengers and more than 22,000 short tons of cargo. The Task Force Hawk deployment proceeded very smoothly, and USAREUR did a good job marshaling its forces and avoiding takeoff delays. Senior Army leaders worked very hard with USAFE to ensure that cargo was airworthy and ready to load on time. Additionally, the Army and the Air Force worked the Intransit Visibility (ITV) equation very hard, resulting in the best ITV the US military has ever had on a major deployment.

As the air war continued and as it expanded with additional Army, Navy, Marine, and Air Force assets, sustainment requirements grew as well. The C-130 became the sustainment workhorse, flying nearly three hundred channel missions to resupply US forces over the course of the air campaign. At their peak, weekly scheduled channels reached 69 missions, and USAFE relied heavily upon its Guard and Reserve augmentation to support them. Operational-support aircraft also filled an important niche by delivering mission-essential parts and transporting diplomatic officials, senior commanders, site-survey teams, and other key personnel around the theater. USAFE's C-9, C-20, and C-21 aircraft flew 44 channels and 553 other missions for the total mobility effort.

Even while the air-mobility team was busy deploying and sustaining forces for the air war, it confronted a major humanitarian crisis as Milosevic's forces expelled over seven hundred thousand ethnic Albanians from Kosovo. Joint Task Force Shining Hope was formed to relieve these Kosovar refugees, and its center of operations was Tirana. Tirana-Rinas became a busy airfield, with activity increasing from five flights per day before the Kosovo crisis to over 60 flights per day supporting refugee relief plus the Apache movement. Close coordination between the Director of Mobility Forces (DIRMOBFOR) and USAFE's 86th Contingency Response Group

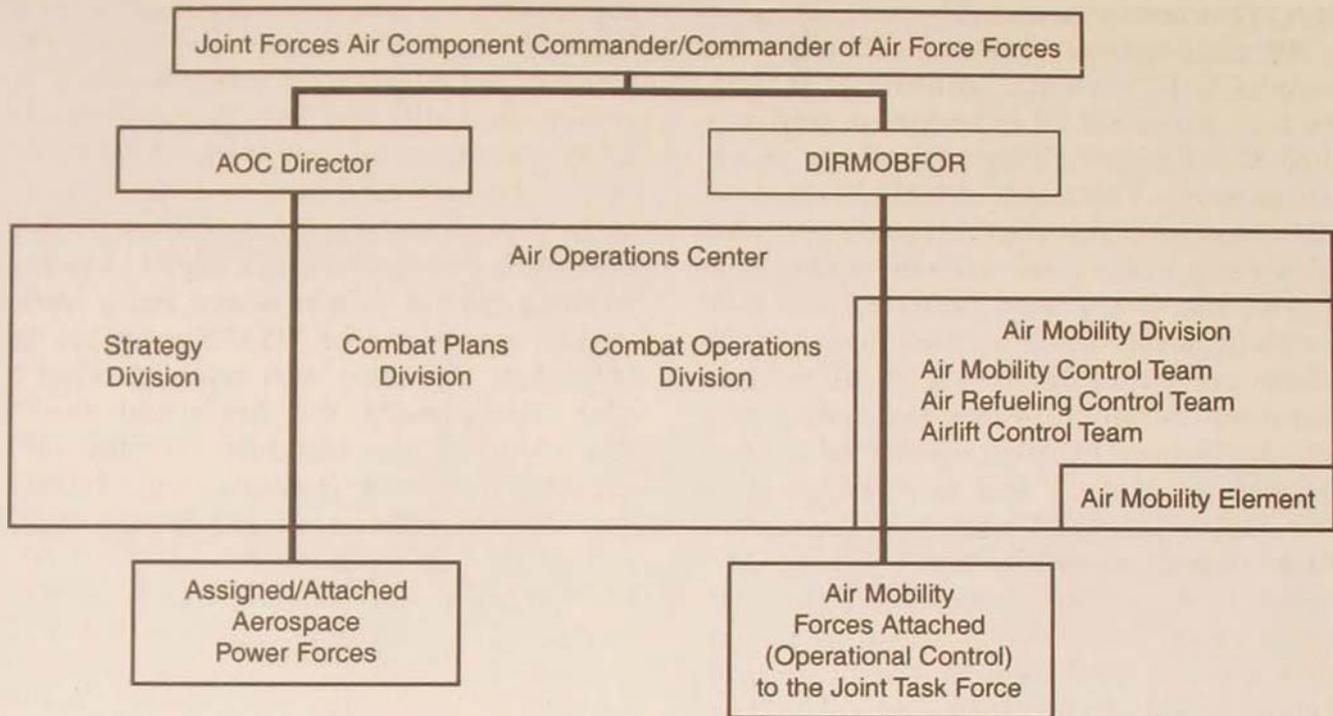


Figure 1. Air Mobility within the AOC (From Air Force Doctrine Document [AFDD] 2, *Organization and Employment of Aerospace Power*, 28 September 1998, 59)

(CRG) synchronized international relief operations with the Task Force Hawk deployment. With superb support from the CRG on-site at Tirana, USAFE C-130s delivered over twenty-six hundred short tons of relief for the refugees. The air-mobility team rapidly delivered much needed food, medicine, and shelter, and saved countless lives before supplies could be transported by surface.

When Milosevic finally capitulated, these refugees flocked back to their homeland behind the Kosovo Force (KFOR), the international peacekeeping force for Kosovo. Task Force Falcon, the US Army contribution to KFOR, required 253 C-17 missions to move over twenty-five hundred passengers and nearly 12,000 short tons of cargo. This deployment was in many ways a model of airlift efficiency and effectiveness, as C-17s first moved troops from Ramstein to Skopje, Macedonia; flew to Tirana to collect soldiers from Task Force Hawk; and either returned them to Ramstein or delivered them to Skopje as part of KFOR. Many missions re-

quired air refueling, and tankers that had supported the air war transitioned to a non-combat role. Together, tankers and airlifters helped bring the air war over Serbia to a close and ushered in the final peacekeeping phase.

Command and Control: Airlift and Mobility Support

In organizing and orchestrating theater mobility forces, USAFE made a concerted effort to implement the body of Air Force doctrine that has been developed in recent months and years. Air-mobility forces are a key component of airpower, and Air Force doctrine provides for an Air Mobility Division (AMD) to be formed within an Air Operations Center (AOC), along with the Strategy, Combat Plans, and Combat Operations Divisions (fig. 1). However, Allied Force fell onto an existing AOC structure. The Combined Air Operations Center (CAOC) at Vicenza, Italy, was formed in 1993 for Balkan operations, and it evolved over the years as the

focus of operations shifted from a no-fly zone to peacekeeping in Bosnia-Herzegovina. At the outset of the Kosovo crisis, the CAOC lacked an AMD as well as a Strategy Division.

Without an AMD, the CAOC confined airlift functions to a Regional Air Movement Coordination Center (RAMCC) outside the AOC structure. The RAMCC had no planning role and served mainly to control slot times into Bosnian airfields for the international Stabilization Force. It also ensured that all airlift and commercial traffic into Bosnia was deconflicted from combat activity on the daily Air Tasking Order (ATO). When the Kosovo crisis flared, the RAMCC was reinvigorated with additional personnel and planning tools to better interface air mobility with combat operations. Although the CAOC never fully subscribed to an AMD being part of the CAOC, the RAMCC provided a critical link to Vicenza for the DIRMOBFOR and served in practice as a forward branch of his AMD.

Col Rod Bishop, the DIRMOBFOR, chose Ramstein Air Base instead of Vicenza as the focal point for Kosovo air mobility. He established an AMD at Ramstein to direct US air-mobility operations and grafted it upon the USAFE Air Mobility Operations Control Center (AMOCC). As the nerve center for USAFE air mobility, the AMOCC had emerged from lessons learned during Operation Joint Endeavor, the deployment of an international peacekeeping force to Bosnia-Herzegovina. Characterized by ad hoc mobility command and control structures, unclear relationships between air mobility and the joint theater-command structure, and poor connectivity between intratheater and intertheater air mobility, Joint Endeavor provides an excellent benchmark to contrast how effectively Kosovo air-mobility operations were conducted.

The AMOCC provided the DIRMOBFOR with important capabilities lacking during Joint Endeavor. Most importantly, the AMOCC served as a single command and control layer for theater air-mobility operations, linked to intertheater air mobility with the proper command and control systems and expertise. Sized for peacetime mobility

planning and execution functions, the AMOCC received augmentation from the 621st Air Mobility Operations Group, a cadre of deployable AMC air-mobility planners. Together with the DIRMOBFOR's staff from the 437th Airlift Wing at Charleston AFB, South Carolina, AMC and USAFE air-mobility experts fused into a single, synergistic team, ensuring that intratheater and intertheater mobility efforts were well integrated. Additionally, Colonel Bishop had already carefully cultivated relationships with theater mobility users as DIRMOBFOR for other recent operations, and he was the recognized focus of theater air mobility.

The improved command and control structure and strong working relationship that developed between AMC and USAFE mobility forces made command relationships much easier to sort out during Kosovo than for previous operations. Transferring TACON of C-17s and TALCEs to USAFE would have been unwise during Operation Joint Endeavor, when the theater lacked the proper command and control structure and expertise to exercise it. The formation of the AMOCC and the stand-up of an AMD populated with AMC mobility experts changed the equation. In our mature theater, with the right tools and resources in place to manage the operation, transfer of TACON became the smartest way to do business. As a result, AMC transferred TACON of 12 C-17s during the deployment of both Task Force Hawk and Task Force Falcon to the USAFE commander.

The DIRMOBFOR exercised TACON through the AMD, and TACON provided the AMD greater flexibility by reducing the required coordination for each mission exponentially. As a result, the AMD was able to be much more responsive to customer demands. Likewise, USAFE TACON of the AMC TALCE at Tirana for Task Force Hawk and at Skopje for Task Force Falcon also increased mobility flexibility and responsiveness. With TACON, the AMD was better able to ensure that the TALCEs had the proper size and composition for the contingencies. In addition, the AMD could also ensure that TALCEs had the

needed support by being in the same time zone and theater. Even when AMC retained TACON over its TALCEs for intertheater mobility support, the TALCEs still worked closely with the AMD, and the AMD provided an invaluable link between the TALCEs and AMC.

More clearly defined air-mobility command relationships and a better command and control structure enabled a highly effective operation that compiled a tremendous record in which all passengers and cargo for the Kosovo operations were delivered on or before their latest scheduled arrival date. While the theater air-mobility system worked very well, the Air Force can take some further steps to make it even more effective. In the future, transfer of TACON over US Air Mobility Command-assigned assets should become routine whenever it makes the most operational sense to do so. However, TACON will not work in every theater; it requires a mature theater with a robust air-mobility system to be effective.

The AMOCC provides a highly developed air-mobility structure in peacetime, and the melding of AMC and theater expertise in an AMD provides a tested and proven command and control mechanism for contingencies. The next step is for the AMOCC and AMD to be incorporated into joint and combined doctrine. Joint doctrine does not provide for an AMOCC even though USAFE and the Pacific Air Forces have established it in their theaters. USAREUR has already incorporated both the AMD and AMOCC in practice by attaching liaisons to the AMOCC in peacetime and to the AMD during the Kosovo operations. Joint doctrine must now formalize these structures for the rest of the Army and other services to recognize.

Similarly, NATO doctrine must better integrate air mobility. In the post-cold-war period, NATO has evolved from a forward-deployed force to one with most forces based at home garrison. The lack of a defined threat prevents forward deployment in today's strategic environment. As a result, air mobility will be a crucial element in rapidly reinforcing any NATO member threatened by an outside

power. As it transitions to a more mobile alliance, NATO needs to follow the US Air Force's lead and adopt a command and control architecture that fully integrates air mobility with air combat operations. Because the United States presently owns the bulk of NATO's air-mobility assets, this structure will also require command and control tools that are interoperable with US systems. Only then will NATO be able to fully maximize the mobility resources available to the alliance.

Command and Control: Air Refueling

Allied Force presented some of the most significant challenges ever faced by the tanker community. The Combined Forces Air Component Commander (CFACC) gave the CAOC director responsibility for intratheater tanker operations tasked on the ATO to refuel combat and combat-support aircraft. This was the same arrangement as for Operation Deliberate Forge, the Bosnian peacekeeping operation. Tanker experts were part of integrated teams assigned to the Combat Plans and Operations Divisions. Led by a major with extensive AOC and tactics experience, CAOC tanker planners worked hand in hand with other combat and combat-support planners to build and execute a well-thought-out air-refueling plan.

Nevertheless, these tanker experts faced some major obstacles. The CAOC was not properly manned initially for a rapidly expanding air campaign of uncertain duration, and it was slow in expanding a tanker staff sized for Deliberate Forge. When augmentees did reach Vicenza, many lacked the requisite tanker-planning skills. The team that eventually assembled was highly motivated, but it was largely a pickup team with widely varying levels of training. With its inadequate size and training in the first month of the campaign, the tanker cadre was nearly overwhelmed.

The tanker-planning staff was charged with producing a daily ATO tanker plan, managing the tanker section of the Allied Force Special Instructions, updating the air-refueling

communications plan, and designing refueling airspace for the Airspace Control Order. At the same time, the staff was responsible for sizing the tanker force and staffing additional tanker requirements needed to sustain an expanding operation. This inadequately manned cadre lacked a senior tanker officer to provide them "top cover" as they were inundated by questions on tanker operations from numerous outside agencies. With the air campaign continuing to grow and with concerns about tanker utilization and beddown increasing daily, the CFACC decided that a senior officer was needed to address tanker issues and explain the Allied Force tanker plan to outside agencies.

One month into the air war, a very experienced tanker colonel arrived as the "single voice" of tankers within the CAOC. He quickly became the focal point for justifying and staffing tanker requirements and helping USAFE identify suitable tanker beddown locations. His presence allowed the chief tanker planner time to design a new refueling-air-space architecture for an air campaign that eventually tripled its original size. The redesigned air-refueling airspace also greatly enhanced flying safety for the duration of the air campaign. Together, this team brought greater efficiency to tanker-planning efforts and explained the tanker plan more effectively to outside agencies.

Air Force doctrine needs to distinguish between combat-support air refueling and other tanker roles. Combat-support refueling derives from a different process, requires different command and control systems, and yields a different product than other types of refueling. It derives from the aerospace assessment, planning, and execution process, a cyclical process with no defined finish short of an air campaign's conclusion. Supervised by the AOC director, combat and combat-support experts within an AOC use the Contingency Theater Automated Planning System as their enabling tool to develop and execute an ATO. In the combat-support role, tankers are force multipliers for combat and other combat-support aircraft. Tankers enable the ap-



A KC-135 refuels a B-2 Spirit. Ironically, as the key enabler to Global Reach—Global Power, air refueling is old (in aviation terms) and comparatively low tech. Yet, it may well be one of our most envied and, because of the expertise and infrastructure, least reproducible capabilities.

plication of combat airpower in their contribution to the aerospace assessment, planning, and execution process.

By contrast, tankers are an integral part of the joint-movement process when supporting fighter deployments and air bridges for airlift, and when carrying cargo and passengers in an airlift capacity. This linear process has a defined start and finish that originates with a movement requirement and validation, and ends with pickup and delivery. Directed by the DIRMOBFOR, command and control structures such as the AMOCC and AMD are best organized and equipped to plan and execute intratheater air movements in coordination with AMC's Tanker Airlift Control Center. Air-mobility planners use tools such as the AMC Analysis and Deployment System

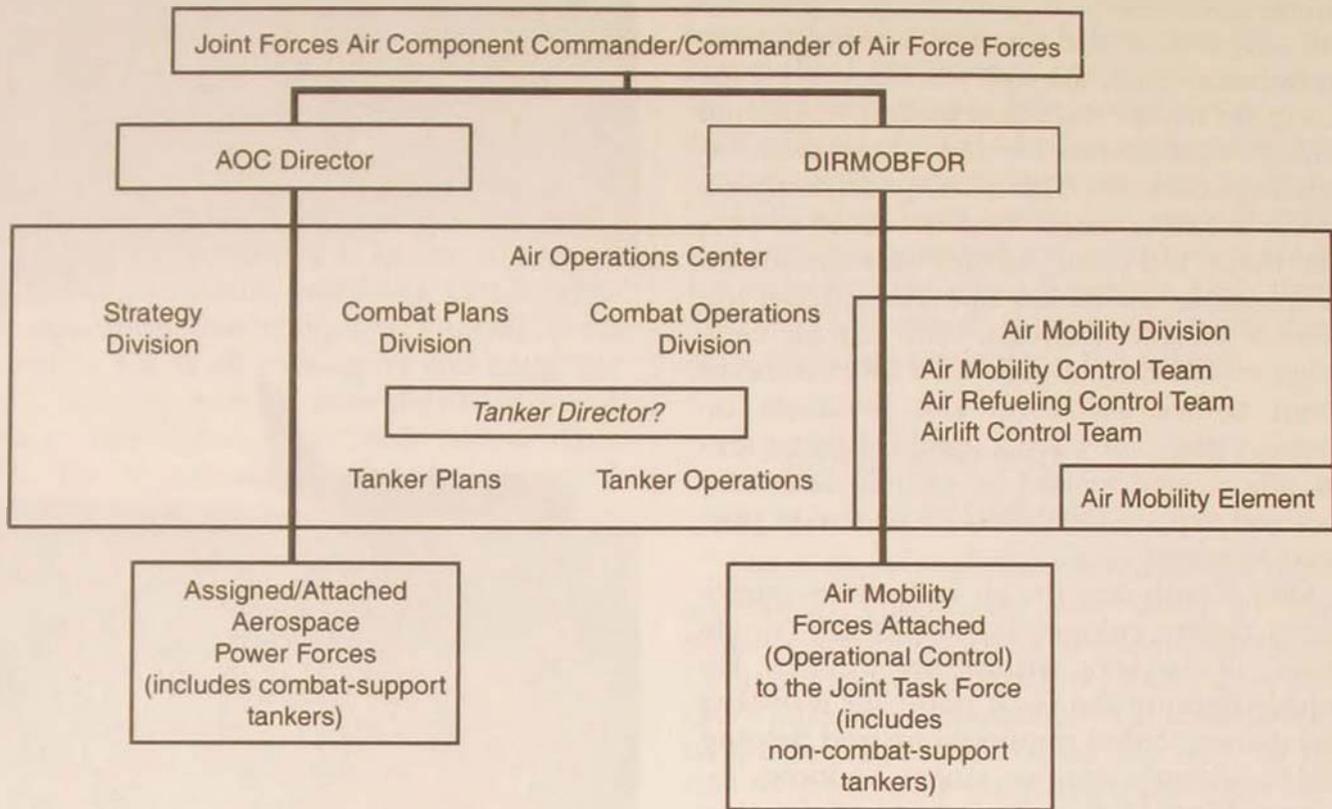


Figure 2. Proposed Change to Command and Control for Air-Refueling Forces

and Global Decision Support System to turn validated movement requirements into actual missions. The final product of the joint-movement process is aircraft, personnel, and short tons of cargo delivered rather than the application of combat airpower.

Ultimately, the key to effective air refueling is to match command and control responsibility with the correct process. Tanker planners must also be allocated according to process. During Allied Force, the tanker planners were placed in the Combat Plans and Operations Divisions so they could be integrated into teams with other combat and combat-support planners (fig. 2). This allowed them to actively shape air-refueling requirements from concept to execution; properly size the tanker force; and effectively plan, task, and execute combat-support refueling. At the same time, an Air Refueling Control Team belongs within an AMD to plan and execute tanker missions other than combat support and to assist with tanker deployment and beddown. In the end,

AOC manning must remain flexible enough to allow for the flow of some tanker experts between the Combat Plans and Operations Divisions and the AMD as the operational focus shifts from deployment to employment and finally to reconstitution.

Allied Force also demonstrated a need for a senior officer to represent tankers within an AOC, especially when an operation reaches the magnitude of the Kosovo campaign. A senior tanker officer would serve as the principal air-refueling advisor to the AOC director and Joint or Combined Forces Air Component Commander. In this capacity, a senior tanker representative could effectively coordinate beddown and address air-refueling issues with outside agencies. Although AOC tanker planners would continue to work in Combat Plans and Combat Operations, a senior tanker officer would relieve the tanker cadre of these staff responsibilities and allow them to focus their entire effort on preparing an air-campaign tanker plan. Finally, Allied

Force pointed out a need for a larger cadre of properly trained tanker planners prepared to plan and execute any air-refueling role. These experts will require realistic training exercises to further hone and develop their skills. As a key enabler of the Expeditionary Air Force, air refueling must be supervised and planned by well-trained tanker experts.

The Road Ahead

Kosovo was a major expeditionary test for the US Air Force and its air-mobility team. Tankers provided the backbone of the air campaign and the lifeblood of an operation that would have been impossible without air refueling. Tankers also teamed successfully with airlift to form an air bridge deploying US ground forces to Kosovo. Airlift and mobility-support forces compiled a similarly impressive record by reinforcing and sustaining theater combat forces, deploying the Apache contingent to Albania, and providing desperately needed humanitarian relief to Kosovar refugees. While the air-mobility effort was a tremendous success, an operational test of this magnitude provides a unique opportunity to reassess Air Force doctrine.

Although Kosovo validated much of the Air Force's air-mobility doctrine, we must re-

assess how doctrine worked and revise it wherever necessary. The AMD and AMOCC concepts proved highly effective in practice; now, they must be incorporated into joint and combined doctrine. NATO especially should consider incorporating these structures as its dependency on mobility grows. These organizations also provided the means to effectively exercise TACON of strategic mobility assets, so that in the future, transfer of TACON to a theater commander should be routine whenever it makes operational sense. In addition, the Air Force must now evaluate the direction of combat-support air refueling and place responsibility with the AOC director as the process owner for combat operations. At the same time, a senior tanker advisor must be formalized in doctrine to make command and control of combat-support tankers even more effective.

As a central enabler of airpower's victory, air mobility compiled an impressive record of successful accomplishments, but now is not the time to rest on our laurels. Kosovo raised our awareness about steps we can take to be even better prepared tomorrow. Reflection on the Kosovo air-mobility effort today will yield a more expeditionary Air Force tomorrow. □

Untutored courage is useless in the face of educated bullets.

—Gen George S. Patton

FOCUS: Morale and Targeting

"OH YEAH? Well then, I quit!" Thankfully this was not the attitude of so many of our heroic predecessors. But how many times has this thought gone through the minds of Air Force members? It relates to the bad news that leaders hate to hear from the first sergeant: "Sir, morale is down."

Sometimes morale issues are trivial; at other times, sinking morale can cause mission failure. Carl von Clausewitz's conceptual trinity of war concerns morale, in which popular support as manifested in the "violence" of the people—their willingness to fight or to have their soldiers do their fighting for them—can have great effect on wars (remember Vietnam).

Morale is as important as ever to the Air Force today. Despite numerous programs to boost morale, many troops are still complaining. Beautiful leather flying jackets helped a little with some Air Force officers, but then they created morale problems of their own for other officers. Various monetary bonuses may be of some benefit, depending on what motivates individuals, but they can lead to resentment from others who receive less pay.

Air Force leaders today are concerned about morale and are organizing an Expeditionary Air Force (EAF) designed to alleviate stress from a high operations tempo. The trouble with morale and deployments is that people are people. Many enter the Air Force seeking excitement to include travel and a variety of jobs. Yet, these same people may also desire some consistency and routine predictability. As to the right amount of either consistency or inconsistency, that is largely individual preference. Yet, the Air Force's mission and schedule cannot accommodate all individual preferences.

Even with the predictability of an EAF plan, Air Force members will still come to realize that they must deploy, that long and dif-

ficult hours are part of the job, and that service to country is no walk in the park. Many Air Force members have experienced difficult times and personal sacrifice to fulfill the mission. They have proudly lived "service before self," and their service has resulted in tremendous good for the nation and the world. The EAF promises to carry on with similar effectiveness.

On the other hand, this positive can be drowned by a negative—negative morale stemming from faulty expectations of life as a member of the profession of arms. One current perception is that the termination of hostilities in Kosovo has ended the Balkan problem, thus allowing for rest and recovery. Hopefully so. But often one conflict leads to another, and what will that do to the morale of those expecting a reprieve?

Contrary to popular misperception, "this is your fathers' Air Force." Despite impressive technological advancements, the Air Force is still the challenging profession that has always called for courageous, self-sacrificing heroes. It is the Air Force of Generals Curtis E. LeMay, Carl A. Spaatz, Henry H. "Hap" Arnold, and so many other leaders, flyers, and support personnel who dedicated their lives to the legacy we now enjoy.

Morale involves conscious decisions based on perceptions and expectations. Reading and thinking about our past, present, and future promote a mature perspective of morale in relation to the mission. The following articles consider morale historically and theoretically, and they focus on the targeting dilemma of trying to achieve the desired effect on the enemy's ability and desire to continue the fight. These articles contribute to the morale perspective, and, after all, we all need a morale reality check now and then.

EAA

Exploiting the Psychological Effects of Airpower

A Guide for the Operational Commander*

Maj Jon Huss, USAF

Air power is, above all, a psychological weapon—and only the short-sighted soldiers, too battle-minded, underrate the importance of psychological factors in war.

—B. H. Liddell Hart



THE PRIMARY ROLE of airpower in our nation's defense has been hotly debated since the aircraft was first introduced into combat. The ability to exploit the third dimension of the battle space is what gives combat aircraft their uniqueness and is the source of airpower's strength. It is the airman's responsibility to exploit this third dimension both to protect our own forces from attack and to directly or indirectly reduce the combat capability of the enemy forces through the proper application of airpower. A force vulnerable to attack from the air is a force with an exposed flank. Airpower's primary mission at the operational level of war is to expose that "third flank" and exploit it by all effective means to reduce or destroy the enemy force's ability to wage war.

The attempt to reduce or destroy a force's ability to wage war has two possible aspects—the physical and the psychological. The phys-



ical aspect deals with the denial, damage, or destruction of the tangible items the enemy requires to wage war. Weapons, equipment, vehicles, roads, and so forth are all viable physical targets that should be rendered useless so enemy forces cannot rely on them to wage war. The psychological aspect deals with the denial, damage, or destruction of intangible items the enemy needs to wage war. Here, the "hearts and minds" of the enemy's fighting forces are targeted, and the desired effect is to render those forces unable or unwilling to use the weapons, equipment, vehicles, roads, and so forth required to wage war. Degradation or destruction of the enemy force's will to use tangible war-making assets has the same effect on combat capability as actually degrading or destroying tangible assets. Attacking enemy critical vulnerabilities for both physical and psychological effect can produce a synergistic result on the enemy force's capacity to wage war.

* A previous edition of this article received an honorable mention in the 1999 Red River Valley Association Award competition for outstanding thought and research on joint employment of airpower in support of national military strategy.

Airpower has demonstrated its capability against the physical assets of our enemies throughout history. However, its capability against the psychological assets of our enemies is often misunderstood and underutilized. An understanding of airpower's inherent strengths in the psychological dimension can return great dividends at the operational level of war. This understanding, properly applied by the operational commander and both air and ground force campaign planners, can significantly improve the efficiency of our operations and the probability of their success.

Stress and Fear on the Battlefield

Loss of hope, rather than loss of life, is the factor that really decides wars, battles, and even the smallest combats. The all-time experience of warfare shows that when men reach the point where they see, or feel, that further effort and sacrifice can do no more than delay the end, they commonly lose the will to spin it out and bow to the inevitable.

—B. H. Liddell Hart

Stress and fear are inherent to any battlefield, and their effect on fighting forces is significant. During studies conducted on combatants in World War II, 68 percent of the men involved "admitted that not only had they experienced fear and anxiety at some time in combat, but also that they had experienced it at a level that prevented them from completing their duties."¹ This high percentage of combatants that actually admitted to at least brief impairment in mission capability in battle gives credence to the belief that no fighting man is immune from the stresses of combat and that every man has a breaking point. Of particular note is a quote from the *Marine Corps Gazette* on the subject that "there is no such person as the soldier who is dauntless under all conditions of combat. There is no such unit as the company that stays good or the company that is shockproof . . . every Marine has a breaking point if the stresses are strong enough and of long enough dura-

tion."² The fear, stress, and anxiety felt by those engaged in combat derive from many stressors present on the battlefield. A. P. N. Lambert lists 14 of these stressors in his book *The Psychology of Airpower*. Let's focus on six that are particularly applicable to the effects of airpower at the operational level of war.

Claustrophobia

The loss of personal movement amplifies the effects of the other stressors. The loss of movement on the battlefield denies the soldier his instinctive reaction to stress, increased physical activity. Accounts of soldiers' battlefield experiences also connect this personal immobility with a loss of the sense of time.³

Noise

Exposure to irregular and high levels of noise can preclude the ability to think clearly. Inexperienced troops often incorrectly correlate the level of noise a weapon produces with its expected lethality. An excellent example of purposely using noise to enhance a weapon's effect was the German use of the Stuka dive bomber early in World War II. In one instance, a British officer recounts that after one particular attack that caused relatively little physical damage, his unit was "absolutely shattered" psychologically.⁴ The distinctive sound of a Stuka attack often generated so much fear that the noise caused more damage than the munitions the aircraft delivered.

Ignorance

The lack of knowledge provides a fertile breeding ground for all sorts of counterproductive activities. When troops are unaware or unsure of either enemy or friendly positions, movements, or intentions, their situation is ripe for the festering of fear, rumors, and panic. In *Men against Fire*, renowned combat historian S. L. A. Marshall chronicles several instances during World War II in which an unplanned, unannounced, or misunderstood movement to the rear by an individual or small group during battle led to the inad-

vertent withdrawal of a much larger group. In each case, Marshall noted that the sight of the individuals running to the rear was not the root cause of the panic. In each instance, the stimulus for panic was the lack of knowledge as to *why* that movement was happening. This panic led the uninformed troops to join in the rearward movement, in some instances believing that a command to retreat had been issued and they had somehow missed it.⁵

Isolation

Forces vulnerable to attack will naturally disperse, and the soldier may find himself rather alone in a time of great danger. The soldier's fear is amplified when he is isolated without the reinforcement of his comrades enduring a shared experience. Describing being caught in a mortar attack while separated from friendly lines during the Korean War, S. L. A. Marshall admitted that the terror he felt was nearly overwhelming. To use his own words, "Be a man ever so accustomed to fire, experiencing it when he is alone and unobserved produces shock that is indescribable."⁶

Fatigue

Lack of sleep and a shortage of basic personal needs (food, water, and hygiene) contribute to fatigue. The importance of providing for the basic human necessities cannot be overstated. In one telling example, a German captain confronted with a case of insubordination (refusal to man assigned positions) within one of his platoons during the battle of Stalingrad, allowed the offenders to eat and sleep at his quarters that night. In the morning, he had no trouble in convincing them to return to their posts and continue fighting.⁷

Helplessness

The feeling of not being able to fight back is a major combat stressor. This often stems from a belief that the enemy's weapons are superior and one has no defense. This leads to feelings of impotence and lack of control. These feelings often lead to panic. The first use of the tank by the British in 1916 caused

extreme panic within the German trenches due to the perception that they were totally defenseless against this new and unexpected weapon.⁸

Airpower is well suited to deliver these stressors to the other side of the battlefield and focus them on the enemy's deployed forces. Combined, these stressors can lead to the feeling of hopelessness that, as Liddell Hart reminds us in the opening quote, is catastrophic to a fighting force. Well-planned and executed air operations can successfully increase the levels of fatigue, helplessness, noise, claustrophobia, isolation, and ignorance to a point where enemy forces are mentally unable or just plain unwilling to perform their duties effectively.

Planning to Exploit the Stressors

The process of linking ends and means is a crucial yet too often overlooked requirement for the aerospace strategist. The ultimate results are often psychological in nature; war is after all a human endeavor. . . . Understanding the links between cause and either physical or psychological effect is a key part of aerospace planning.

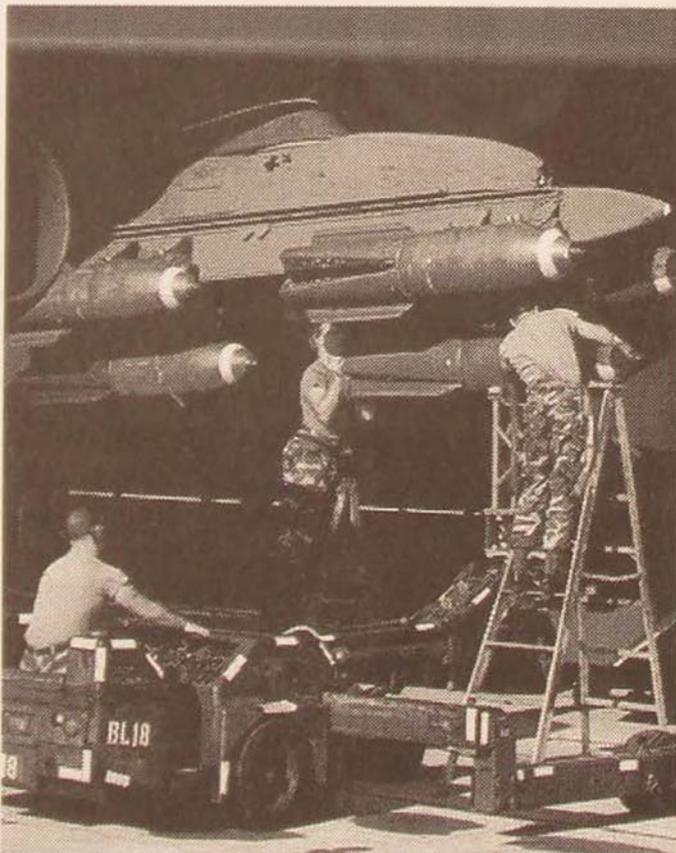
—Air Force Doctrine Document (AFDD) 2-1, "Air Warfare" (draft)

The planning stage of an operation is where an understanding of these stressors and how best to use airpower to increase them should be integrated with the operational plan to enhance the psychological decay and defeat of the enemy. There are three major aspects of planning that I will discuss: targeting, timing, and integration of air operations with a robust psychological operations (PSYOP) plan.

Targeting

One of the greatest controversies surrounding the use of airpower has always been what to hit, when, and how. In a nutshell, that is targeting. All too often, the planner focuses entirely on the destruction of equipment and

not on the degradation of capability. Capability is the combination of the tangible assets required to make war and the knowledge, will, and courage of the fighting forces to operate those tangible assets. Destruction is useful, but it is not the only way to degrade capability. If the planner focuses only on destruction, he limits the effects of his plan to the physical assets of the enemy. If, on the other hand, the planner focuses his efforts on the enemy's true war-fighting capacity, he leaves himself open to exploit both the physical and psychological aspects of the battlefield and may be able to reach the same operationally relevant result with much more economy of force. This is what is known as targeting for effects as opposed to targeting for destruction.⁹ I recommend three types of targets for their potential psychological effects: air defenses, troops, and logistics. The targets themselves offer nothing new or revolutionary, as they would normally be found on any air planner's target list. What is different



A B-52 is loaded with 750-pound bombs during Operation Desert Storm.

about my recommendations is the intended effect of attacking these targets.

Air Defense. He who controls the airspace above the battlefield can use that space to maneuver and attack from where he wants and when he wants. Gen Erwin Rommel understood this advantage well, lamenting in his personal papers that "anyone who has to fight, even with the most modern weapons, against an enemy in complete control of the air fights like a savage against modern European troops, under the same handicap, and with the same chance of success."¹⁰ This freedom of maneuver, the ability to strike anywhere and everywhere, gives airpower the illusion of omnipotence. A perception of enemy omnipotence increases a soldier's feelings of isolation and helplessness because he has nowhere to turn for help. It restricts his movement and increases his fatigue because there is no place or time of day that he is not under the constant threat of attack. He is left to wonder, in his ignorance, why there is no defense. The objective is to make the enemy believe that he is defenseless against our airpower. In his study of US air operations from the Korean War to Desert Storm, Stephen Hosmer found compelling evidence that when aircraft were able to attack with virtual impunity, enemy forces were significantly demoralized.¹¹ The result of this demoralization was a reduced capacity to fight. Regardless of the amount of physical damage they sustain during these attacks, if the enemy perceives that we are paying little or no price for our air action, he will assume that there would be little or no reason for us to stop or reduce the intensity of that action. This sense of futility and the inability to see an "end in sight" greatly increases the enemy's perception of impotence and helplessness. The frustration of watching seemingly omnipotent coalition aircraft go unchallenged in the skies over the Kuwaiti theater of operations (KTO) was captured in an Iraqi soldier's diary. After experiencing 21 days of coalition air operations, he wrote that "the enemy planes patrol the skies bombing as if in their own skies. There is no worthy resistance except from here and there.

We don't know the secret behind that. Are they saving their resistance until the expected ground attack starts? We don't know!"¹² Air superiority must continue to be the primary objective of future air operations plans, not just for obvious force protection benefits but also for their exploitable psychological effects on enemy forces. Offensive counterair (OCA) and suppression of enemy air defense (SEAD) missions must have leading roles in a well-choreographed operational dance.

Troops. The enemy's deployed forces are also a target that should be attacked for both physical and psychological benefit. The physical benefits of destroying the enemy's equipment and killing his troops are obvious. However, the psychological benefits are more subtle and can differ depending on the types of weapons used. There are distinct differences in the effects of precision-guided munitions (PGM) and unguided munitions. The obvious benefit of using PGMs from the physical-effect aspect, is the increased probability of killing or damaging targets while decreasing the probability of collateral damage. The psychological effects of PGMs are often different between noncombatants and combatants. Due to reduced probability for collateral damage, noncombatants are much less fearful of a PGM strike than one carried out by unguided munitions. This was evidenced perfectly during the December 1998 Desert Fox strikes against Iraq. The average citizens in Baghdad paid little attention to the action and went about their normal routine. Their confidence that the US strikes would be confined to military targets led to a very low estimate of personal danger. Combatants, on the other hand, often react differently, especially when they are responsible for manning and operating those targets. If they have a similar confidence in US PGM capability and accuracy and they believe their weapons, equipment, building, installation or area to be a target, they may take measures to put some "survivability distance" between themselves and that target. While this action may have very little exploitation value in the type of static, surgical-strike police action strategy we

have employed against Iraq for the last eight years, it is extremely exploitable if ground action is scheduled against those targets. During Desert Storm, a tactic known as "tank plinking" was developed to increase the reliability of air-strike battle damage assessment (BDA). The basic idea was to use PGMs against Iraqi armor in the KTO at night. The F-111 and F-15E aircraft could easily detect these targets with their forward looking infrared radar (FLIR), and the GBU-12 proved itself a capable tank killer with a direct hit.¹³ While the physical effects of 19 nights of tank plinking were significant to the subsequent ground offensive, they were minuscule when compared to the psychological effects those sorties had on the armored forces in the KTO. The effect of random tanks blowing up sporadically throughout the night drove those tank crews to seek shelter a safe distance away from their weapons. The amount of equipment the fleeing Iraqis left behind was staggering, but the truly amazing fact is just how much of that equipment had been abandoned well before it was ever directly threatened by coalition fire. A joint intelligence survey team conducting a postwar physical inspection of Iraqi armored vehicles remaining on the battlefield found that only slightly more than half of the tanks inspected had been hit by coalition fire. More significantly, in the team's estimation, only a few of those tanks actually hit by fire were occupied by the crews at the time they were hit.¹⁴ A captured Iraqi general summed up the common feeling of helplessness among Iraqi tank crews by saying, "During the Iran War, my tank was my friend because I could sleep in it and know I was safe . . . none of my troops (in Desert Storm) would get near a tank at night because they kept blowing up."¹⁵ By the time the ground offensive started, it was apparent that airpower had convinced a significant number of the enemy that the best tactic for survival was to separate themselves from their weapons.

PGMs are not a requirement to get a psychological bang for your buck when targeting troops. Unguided munitions bring utility to the effort as well. Along with tank plinking,

we were continuously targeting the Iraqi troops in the KTO with enormous quantities of unguided munitions as well. Gen H. Norman Schwarzkopf intended to "destroy Iraqi morale by physically annihilating one of the Republican Guard divisions" with B-52s.¹⁶ His aim included exploiting the psychological dividends of airpower, but primarily through destruction. In actuality, the physical damage to the fighting equipment of these divisions was light, but the strikes still had extreme psychological effect and operational payback. The noise, intensity, and duration of the B-52 strikes made them the most feared type of attack for a significant number of Iraqi soldiers. B-52 strikes have provided significant emotional events in the lives of survivors since their first combat use in Vietnam. A Vietcong minister of justice described it as like "being caught in the Apocalypse" and explained that "one lost control of bodily functions as the mind screamed incomprehensible orders to get out."¹⁷ The strikes create a claustrophobic effect. The mind wants to run, but the incredible noise and shock from a stick of 72 Mk-82s pin the body down. While the B-52 attacks in the KTO were originally conceived as a destruction mission, the decision to continue these attacks at night was made for psychological reasons. The intent was to keep the target units awake and add fatigue to their cumulative list of stressors. To this end, the B-52 proved a very effective weapon. One senior Iraqi officer complained that he could hardly sleep more than two hours at a time and that the constant pounding shattered his men's nerves to a point that they nearly went mad.¹⁸ Surprisingly, this effect was due more to the experience of living through an attack, not the probability of being killed during one. That same Iraqi officer admitted that the B-52 raids actually produced relatively light casualties in his unit.¹⁹ An amazing point gained from prisoner of war (POW) interviews after the war was that the intensity of the B-52 strikes actually had a psychological effect on the forces that were never actually attacked by the B-52s. The strikes could be felt and heard by units as far away as 40 kilome-

ters. The B-52 was so universally feared that in one instance a troop commander identified it as the sole reason he surrendered his troops to advancing coalition forces. Reminded by an interrogator that his position was never attacked by B-52s, he stated, "That is true, but I had seen one that *had* been attacked."²⁰

Logistics. In the earlier discussion of the different combat stressors, I mentioned the importance of adequate food and water to prevent fatigue. Hosmer's analysis of the Korean and Gulf wars points out the correlation between effective supply interdiction air operations and periods of high surrender rates during combat. Over 65 percent of Chinese soldiers surrendering during the spring offensive of United Nations (UN) forces in 1951 told their interrogators that rations were inadequate, and some reported that their units were so short of food that troops were forced to eat grass and roots.²¹ Iraqi infantry units in southern Kuwait were so drastically short of food and fresh water that some Iraqi officers believed that had the coalition ground offensive been delayed another two weeks, the Iraqi high command may have had to withdraw its frontline units to avoid logistical strangulation.²² The situation in Korea was due mainly to classic interdiction operations against bridges, rail lines, and supply depots, while the Iraqis were more affected by the loss of frontline units' rolling stock and the lack of drivers willing to risk movement to and from the depots.²³ The common connecting ties are that both were products of airpower and both decreased the ability and will of enemy forces to wage war.

Timing

The timing of air operations is equally important to targeting. The question of when to strike is as critical as what to strike. In order to exploit the psychological effects of airpower, the operational commander must plan for air operations that are sustained and closely integrated with ground operations.

Sustained Operations. One of the most enlightening results of Hosmer's analysis of air operations in Korea, Vietnam, and Desert

Storm is the difference in the psychological success of the operations compared to their duration and intensity. During periods of both the Korean War and Desert Storm when large numbers of enemy combatants surrendered, the troops had been subjected to sustained air attacks over a significant period of time. During both the 1950 and 1951 routs, the Chinese forces had been on the offensive for several months and had been constantly under attack by UN air forces. The Iraqis in the KTO had been continuously under attack (or the threat of imminent attack) for 38 straight days without respite. By contrast, the communist forces in Vietnam, while often attacked violently, were never brought under sustained air attack. Communist forces would engage in brief battles and then withdraw to rear areas where they were able to rest and reconstitute.²⁴ Around-the-clock operations will be necessary to deprive the enemy troops of sleep. Along with food and water, adequate sleep is an integral part of preempting fatigue. If people are totally deprived of sleep for 24 hours, their efficiency is reduced; for 48 hours their efficiency is severely restricted; and after 72 hours it is nonexistent.²⁵ Any break in the air operations could be extremely counterproductive to exploiting any previously gained psychological benefits because a soldier's reconstitution time can be rather short. In the instance cited earlier, the German soldiers at Stalingrad were able to return to their posts after one night's decent rest and one meal. In a separate example from the battle for Monte Cassino during World War II, German officers were able to send soldiers back (without coercion) to the very posts they had run away from after approximately two hours' worth of rest and food in a rear area secured from air and artillery attack.²⁶

The Importance of Coordinated Ground Operations. Airpower is very capable of delivering and increasing the psychological stressors that reduce a force's combat capability, but it is not very good at cashing in on the rewards. This strikes at the heart of airpower's responsibility to prepare the operational battlefield. A reduction of enemy ground force combat



A military headquarters and barracks used by Iraqi troops during the occupation of Kuwait. They were attacked by coalition aircraft prior to the retreat of Iraqi forces from Kuwait during Operation Desert Storm.

capability does not necessarily mean a blue-force victory. Enemy forces convinced that resistance is futile may continue to man their posts until confronted by our ground forces on the offensive. In both the Korean instances cited above and during Desert Storm, the enemy was presented with UN or coalition forces on the attack. The presence of our units maneuvering on the battlefield provided the enemy troops with two things. First, it forced them to make (sometimes very quickly) a decision whether to continue the fight or surrender, and second, it gave them someone to surrender to. In marked contrast to the two periods of the Korean War and Desert Storm, when enemy forces surrendered in abundance was the November 1951 to July 1953 period of the Korean War. This period, marked by the adoption of an "active defense" policy by the UN forces, produced some of the highest close support sortie rates and some of the fiercest fighting of the entire war but a minuscule amount of enemy surrenders. One of the major factors in this difference in the psychological health of the enemy soldiers and the resultant lack of surrenders was the lack of offensive pressure by UN ground forces. Even though communist forces suffered an enormous amount of casualties (an estimated 250,000) during the last 15 months of the war, the UN's decision to adopt a defensive strategy made it possible for the enemy to control the initiative and more easily reconstitute their forces' morale between battles.²⁷

Integration with PSYOP

An operational commander's PSYOP plan involves much more than just his air operations plan, but integrating the two plans is absolutely essential in order to fully exploit the psychological effects of airpower. Besides the major effort of trying to convince the enemy that resistance is futile and explaining how to surrender and whom to surrender to, an effective PSYOP plan can exploit enemy perceptions created by air operations, and an effective air operations plan can enhance the credibility of the PSYOP message. Some of the best examples of that cooperation come from Desert Storm. The coalition had an intense PSYOP effort to convince Iraqi forces to abandon their equipment during the ground phase of the operation. Leaflets and messages explained that the soldiers would not be attacked if they disassociated from their vehicles and weapons. Iraqis believed this message because of the conditioning they had received during the 38 days of air strikes.²⁸ In effect, the PSYOP message took something the Iraqis had already learned from coalition air assets and successfully associated it with coalition ground forces. In another effort, PSYOP messages were used to give notice to Iraqi troops in the KTO that certain divisions would be attacked with B-52s on certain days. The fact that those specific divisions were attacked as advertised not only added to the Iraqi perception that our airpower was omnipotent, but actually established our PSYOP messages as a credible source of information.²⁹ This in turn enhanced the effectiveness of other, unrelated, PSYOP efforts.

Assessing the Psychological Success of Your Air Operations

In war, the morale is to the material as three is to one.

—*Napoléon*

BDA of the physical effects of airpower is difficult enough, but there is no tougher task than assessing your enemy's will to fight be-

fore he is actually forced into the fight. The psychological effects of airpower cannot be assessed by satellite or FLIR imagery. Perhaps the difficulty in evaluating how much our efforts have damaged an enemy's intangible fighting assets is the very reason those assets are so often ignored to begin with. The best window we have to the enemy fighting man's psyche is interrogation of those that surrender or are captured. Unfortunately, air operations planners do not historically involve themselves in enemy prisoner of war (EPW) interrogations. If the operational commander is serious about exploiting the psychological effects of his airpower, this is a paradigm that must shift. Essential elements of information (EEI) pertinent to the effects the air operations are having on enemy forces are not necessarily known by US Army EPW interrogators. As a minimum, air operations specialists should request specific information from EPW interrogations dealing with enemy force morale, adequacy of sleep, food and water, ease/fear of movement, frequency of contact with superiors, and enemy perceptions of the air operations to date. Ideally, air operations specialists could audit actual interrogations to personally assess the level of the six combat stressors the enemy is experiencing and how the air operations are best contributing to the exploitation of those stressors. Human intelligence (HUMINT) and signals intelligence (SIGINT) are also valuable tools for establishing a psychological profile of the enemy's troops. Air planners should be ready to exploit unexpected windfall opportunities to assess the psychological impact of their operations as well. An example of this was the unexpected mass surrender of over four hundred Iraqi infantrymen at Thaqb al Hajj four days before the ground offensive started. Stumbled upon by 101st Airborne helicopters during a reconnaissance of the intended invasion route and attacked by Apaches and A-10s for four hours, an entire enemy battalion was more than happy to surrender to one US company and a three-man PSYOP team.³⁰ Although not completely appreciated at the time, this event provided a

great deal of foreshadowing for the operations to come.

Possible Views of Others

When we speak of destroying the enemy's forces we must emphasize that nothing obliges us to limit this idea to physical forces: the moral element must also be considered.

—Clausewitz

Possibly the most prolific argument against expending effort on the intangible assets of the enemy is that it is ineffectual on "real" troops. Critics will tend to write off the Desert Storm experience as an anomaly, a "gift" from a cooperative enemy. Admittedly, it is quite possible that we may never again see the degree of wholesale collapse we witnessed during Desert Storm. While combat stressors will continue to saturate the battlefields of the future, an enemy force's ability to handle those stressors and our ability to exploit them will vary depending on the quality and experience of those forces. However, it is important to stress that collapse of the enemy fighting force is not required to make our efforts worthwhile. Any degradation in the enemy force's capacity to wage war increases the probability of our forces' success during ground operations.

Another common counterargument is that without a way to effectively measure the intangible capacities of an enemy, there is no effective way to measure the success of any effort to damage his morale and will. Without a measurement of success, any effort in the psychological realm can appear as wasted effort. The flaw in this argument is that, to a large degree, psychological effects are free. For example, tank plinking was a mission designed for physical effects. The added psychological dividends came at no additional cost. Had the potential intangible benefits been identified earlier in the planning phase, those missions could have started earlier in the operation and been better coordinated with a complementary PSYOP campaign.



Iraqi soldiers surrender to advancing elements of the 1st Marine Division during the third day of the ground-offensive phase of Operation Desert Storm.

A third likely critique of this work is that the focus on the enemy's fielded forces is misdirected, and airpower assets are more effectively utilized against the enemy's true center of gravity, his national will. This article's intentional focus on the operational level of war should not be viewed as an affront to the importance of strategic air operations. The effectiveness of airpower in support of strategic objectives is well documented and widely accepted. This paper is directed at a less glamorous yet equally important application of airpower, those operations in support of the operational commander's battlefield preparation plan.

Conclusion and Recommendations

The psychological effects of airpower can have a significant role in achieving the overall campaign objectives.

—AFDD 2-1.3, *Counterland*, 27 August 1999

Operational commanders and their planning staffs need to have an appreciation for airpower's capability against both the tangible and intangible assets of the enemy. The aim of the commander's operational plans should be to maximize the effects of the air assets under his control across both spectrums. We lack a quantitative method to account for the psychological effects of air operations. How-

ever, that should not dissuade the commander from making the demoralization of the enemy forces a stated objective of his air operations plan. Specifically, I recommend future air operations be designed to convince the enemy forces of four truths:

1. *Their defenses are useless.* Air superiority over the battlefield must be established early and remain well protected with a robust OCA and SEAD plan.
2. *If they move, operate, or remain with their equipment and/or weapons, they will be targeted and killed.* Tell the enemy that you will target their specific weapons and equipment and then demonstrate that capability.
3. *They will receive no rest from the bombing.* Attack the enemy's capacity for rest and regeneration (wherever that may be) with around-the-clock operations. Do not undervalue nonprecision munitions for this task.
4. *The worst is yet to come.* Demonstrate the capability and will to continue to constrict the flow of supplies to the enemy's

deployed forces. Combine air operations with offensive ground operations.

Additionally, the commander must ensure that his air, ground, and PSYOP operations plans are fully integrated and focused on exploiting the psychological vulnerabilities inherent to the modern battlefield and that the planners are actively seeking feedback from all available sources to continually assess the psychological health of the enemy force. Finally, targeting should focus on effects, not necessarily destruction. Air strikes should be conducted with an appreciation of how airpower's perceived omnipotence can influence the combat stressors weighing heavily upon the enemy troops. If done effectively, the cumulative and synergistic effect of these actions may produce an enemy so focused on getting out of the fight that he is willing to abandon his weapons and seek a personal peace instead of performing his combat duties. If we can persuade the enemy to abandon his weapons and duties, we are one giant step closer to winning the war. □

Notes

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Terror Targeting

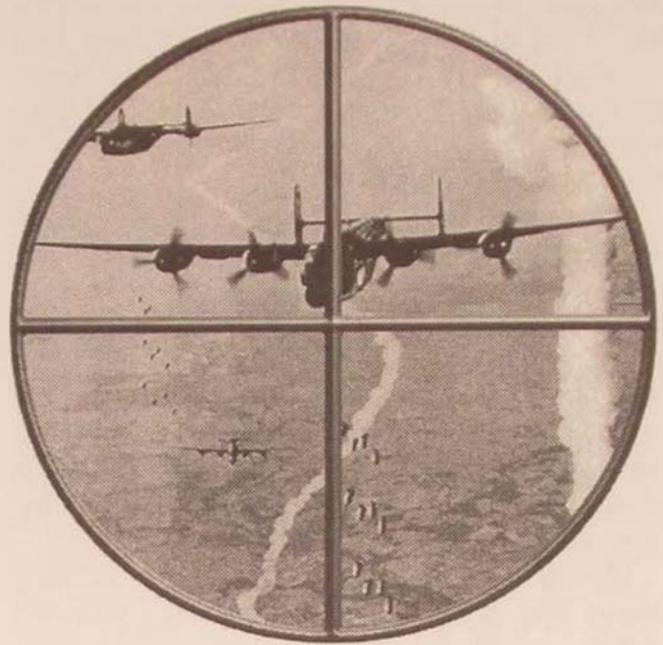
The Morale of the Story

LT COL ERIC ASH, USAF*

One might say that the physical seem little more than the wooden hilt, while the moral factors are the precious metal, the real weapon, the finely-honed blade.

—Carl von Clausewitz

CLAUSEWITZ NOTED CORRECTLY that war is foggy. One of its foggiest elements is morale, a subject clearly less glamorous than high-technology precision weapons and information systems but no less important. There has been no “revolution in morale affairs” to make the gray shades of morale more black and white. Instead, because morale keeps us flying on instruments “in the soup,” it serves as a governor to check the hyper pace of modern warfare. Morale inertia also carries an imperative that the will to win the fight is something the victor must maintain and the vanquished must lose.¹ United States Air Force leaders know this because they continue to face challenges worldwide having to do with people’s willingness or lack of will to keep the peace. Morale played a major part during aerial bombing campaigns in Southwest Asia and more recently in Eastern Europe, where it again remained an elusive but critical factor. In addition, despite the Air Force’s airpower and space power preeminence in the world, its people are suffering declining morale due to high operations tempo and unpredictable deployments. Fundamental to the Air Force’s current scheduling transformation—using on-call expeditionary wings—is a desire to



improve the current morale slump and its consequent impact on retention.

Morale’s interface with high operations tempo and aerial bombing is nothing new to the Air Force, and sometimes a review of the past can help illuminate present situations. Clausewitz once again has appropriate words: “History provides the strongest proof of the importance of moral factors and their often incredible effect: this is the noblest and most solid nourishment that the mind of a general may draw from a study of the past.”²

For this article, the study of the past involves primarily World War II, when US Army Air Forces leaders also faced tough choices as high aircrew morale corresponded to perceptions of success against the enemy, but low morale reflected excessive operations tempo and losses. The article explores morale theoretically as well as historically, linking it to leadership by analyzing how various military leaders approached morale and made it integral to operations. It presents a typology of positive and negative morale and analyzes the role of morale in past wars—in particular,

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World War II area ("terror")³ bombing—to suggest that morale was, and still is, fundamentally one of the most difficult issues with which aerial strategists and aviators have had to deal. Finally, it argues that although morale is a fuzzy subject, it requires both pinpoint accuracy and understanding when it comes to targeting.

This is a high-pitched theoretical study about some complex issues, but it is written for the Air Force flyer, who needs to consider what his or her predecessors were doing and thinking in the past when they launched into the wild blue. Operators need to be thinkers. Especially when one is under the increasing stress of combat and operations tempo, it is important to be morally committed to the mission, knowing that it is the right thing to do.

Morale is an age-old challenge. During World War II's Combined Bomber Offensive (CBO), morale bombing was costly and its success unproven. Likewise, morale bombing still appears to be a major challenge today for "effects-based targeting," particularly for a quick win during the so-called halt phase of war. Another challenge is unit morale, the commander's constant concern. In a way, morale is like a trump card of war, and Air Force decision makers today must appreciate it as one of the major organizational and operational issues facing the Expeditionary Air Force.

At the previous turn of the century, military leaders considered moral force primary to victory. Hence, military leaders had to know how to boost unit morale, and staff-college courses emphasized morale as several times more important than materiel factors. One word, *moral*, meant both morality and morale. Tied to *élan*, moral force, and the offensive, most military leaders considered morale essential to victory.⁴

Morale has different meanings but generally refers to individual or collective mental attitude. Military theorist and historian S. L. A. Marshall says morale is "when your hands and feet keep working when your head says it can't be done."⁵ Another author says it is "wanting to do what you have to do."⁶ These nonesoteric descriptions are useful in understanding morale, particularly in the heat of

battle. If morale is the desire to continue the fight, then strategies must target morale in order to break the enemy's will to resist. This is why morale is so important. It can lie at the heart of targeting for effect.

Yet, targeting morale is complex. It can involve both indirect and direct attack against a multitude of potential targets. One of the most important indirect targets is leadership because it is linked to discipline, key to the strength of unit or societal morale.⁷

According to Marshall, morale and discipline lie on opposite sides of a coin: "When one is present, the other will be also. But the instilling of these things in military forces depends upon leadership understanding the nature of the relationship."⁸ The leader holds that coin in hand and must understand and exploit discipline to boost morale. Discipline and morale come from each other and are symptoms of each other; both play a part under fire to keep soldiers fighting.⁹ This involves not only smaller military units but, as Clausewitz notes, extends to leadership in society.¹⁰

Of course the discipline thing can go too far. A military unit that is disciplined too harshly will have low or "negative" morale. Level of intelligence or education may affect this, insofar as "thinking" people might embrace discipline when it makes sense but then not stand for tyrannical discipline.¹¹ For example, many relatively well-educated members of bomber crews showed strength of will to fly dangerous bombing missions unless they felt hopelessly abused.

The most effective mix is reasonable discipline and unreasonable morale. Reasonable discipline causes soldiers to feel good about themselves as a unit. Unreasonable morale is the kind of enthusiasm that helps soldiers charge into danger or hold ground against difficult odds. Again, effective leadership is the key: "The morale of the force flows from the self-discipline of the commander, and in turn, the discipline of the force is reestablished by the upsurge of its moral power."¹²

Specifically, morale-boosting leadership means caring for the troops, acting justly, setting an impeccable image, and allowing people to see themselves as fighting soldiers.¹³ His-

torian Mark Wells notes in his definitive study of morale in World War II bomber aircrews that leadership was paramount to the success of fighting units and the principal difference between low or high squadron morale.¹⁴

These same concepts would seem to apply as well to civilian societies, which also have levels of social and cultural discipline, often embodied in customs and traditions, understood ethnic codes, or laws. Correspondingly, the leaders of those societies play fundamental parts in setting and maintaining national perceptions and the social will to maintain discipline (i.e., in time of war, the will to fight).¹⁵

Col Dale Smith links leadership, morale, and organizational success, and he identifies nine components of leadership and morale success.¹⁶ Most importantly, to boost morale, the leader must maintain overall unity of purpose and the perception of progress toward that purpose. Thus, a basic morale target is leadership, not so much from the standpoint of Col John Warden's inner ring and the leadership linkage to command and control (C²) but from what might be called "morale control"—the way leadership affects discipline and people's perceptions of a united purpose. Interestingly, none of Smith's components relate to basic living standards often associated with morale and targeted as a way to break the enemy's will.

Although morale is influenced by food, safety, and health, it transcends these basic concerns when it comes to mission and objectives. Morale during World War II was usually higher in active theaters than in noncombat areas, despite the increased danger.¹⁷ Furthermore, at a much safer time of postwar withdrawal, morale dropped to its lowest level of the war. Finally, as the article discusses later in more detail, significantly reduced living conditions in Germany and Japan did not cause the populace to quit working. Again, unit perceptions of successful contribution to the mission and objective override other morale factors, making some of the concepts behind CBO area bombing questionable. The strategy appears to have targeted living/working conditions more than perceptions of objectives and unity of purpose be-

cause bombs were not dropped on urban areas in Germany with the assumption or hope they would hit Nazi leadership. Rather, they were aimed at the general society.

Since Napoleonic times, societies have become part of the fight and sometimes part of the target. Brig Gen Giulio Douhet proposed that aerial bombardment strategy no longer differentiate between combatants and non-combatants. Obviously, this was the situation in World War II, in which civilian morale was as important as that of the military.¹⁸ The military and cultural discipline of the Germans and Japanese from 1940 to 1945 most likely played a large part in maintaining their will to fight. Hence, cultural discipline and national leadership became fundamental factors in the war. Interestingly, however, strict totalitarian regimes and democratic states showed similar levels in the morale strength of civilians,¹⁹ most likely because both types maintained unity of purpose.

Unity of purpose, then, probably relates to the morale *Schwerpunkt* of a resilient people. The morale center of gravity is leadership-inspired individual and collective confidence in unity of purpose. After people have lost confidence in leadership, in their own abilities, and in their contribution to the war effort, they may cease resisting. Targeting confidence, however, is a complex issue, but an important part of it is leadership.

Again, targeting can be direct or indirect. Obviously, leadership influence can be eliminated by cutting command or social-structure linkages so that society no longer associates its confidence with its leaders. Another indirect option involves bombing the society at large so as to kill the populace or at least cause loss of sleep and reduced worker performance.²⁰ That sounds like direct targeting, but it is not. It eliminates the confidence of the victims, but the actual target is the confidence and morale of the surviving population.

The German plan Fall Gelb—the invasion of Belgium, Luxembourg, and the Netherlands—was based partly on the assumption that French moral force was weak and would collapse under the effect of a decisive blow against the army.²¹ According to one author,

"France had become accustomed to defeat and the habit had acquired its own aura of apathetic fatalism."²² Vichy France was a direct result of military defeat and morale collapse.²³ On the other hand, the French resistance movement showed great social discipline and morale strength. Similarly, Soviet civilians and soldiers showed incredible strength of will facing German opposition as well as purges from within: "The Soviet Army displayed a bravery, tenacity and lack of squeamishness about casualties that suggested that the traditional qualities of Russian soldiery had not been undermined by Stalin's tyranny."²⁴ Against such strength of moral will, perhaps Adolf Hitler's Operation Barbarossa was doomed from the start. Although in some respects Hitler may have been a master at using morale to suit his purposes, he clearly did not properly attack Soviet morale—particularly in treating Russians and Slavic people as *Untermenschen* or inferiors. Why moral force collapses in some instances and not in others is part of the chance of war, but the challenge to the military strategist is to at least try to influence the odds.

Direct targeting of morale involves attacking group goals, cultural histories and traditions, symbols, and ideology.²⁵ Psychological operations (PSYOP) is officially the business of targeting the mind of the enemy and often his will to resist, but the distinction with PSYOP is how the message is communicated. Normally geared directly toward morale, PSYOP uses television, radio broadcasts, and other methodologies rather than physical destruction to convince the enemy to do something.²⁶ In addition, information warfare and elements of unconventional/revolutionary warfare seen in the writings of Mao Tse-tung come close to a direct-attack methodology.

Morale bombing in World War II, on the other hand, entailed indirect attack against the will to resist. It followed Alexander de Seversky's advocacy of attacking communications, administration, and basic requirements for living: food, shelter, safety, and clothing.²⁷ Attacking morale in this manner, indirectly, is a strategy of exhaustion. The German strategist Hans Delbrück categorized strategy into

two camps: *Ermattungstrategie* (exhaustion) and *Niederwerfungstrategie* (annihilation). So far, and certainly as the CBO demonstrated, indirect targeting of morale has correlated more closely to an exhaustion strategy.

Many times during World War II, indirect attack—not just from the air—failed to achieve moral collapse. For example, the Germans failed to destroy the will of Soviet citizens during the siege of Leningrad. In a tragic irony, German civilians in Dresden died in the inferno of firestorms while inhabitants of Leningrad froze to death. The fact that these and other examples of indirect attack on morale in World War II enjoyed only moderate success might suggest that strategists misunderstood morale or engaged in terror bombing simply because they had no other option. They were faced with the extreme need to win the war and were committed to do that, no matter the cost.

So far, this analysis has suggested that effectively targeting morale means hitting the leadership and social- or command-structure linkages that give morale its strength. Since morale is linked to leadership, discipline, and perceived unity of objective or purpose, indirect or direct attacks must aim to eliminate those entities. The morale-targeting dilemma, however, is still more complicated than that because morale is a two-way street of cause and effect. For further analysis, one may break morale into parts.

Morale exists in both positive and negative planes. This description is more useful than others, such as "good" or "bad" morale, since the words *positive* and *negative* provide a sense of the electric-emotional charge associated with each. On the one hand, positive morale is the charged-up, excited camaraderie soldiers gain from satisfied needs, their positive sense of mission and unity, or a wide spectrum of other causes. Respect for a leader can manifest itself in positive morale; also, as mentioned, effective discipline plays a key role in positive morale. Most commonly, positive morale involves mutual confidence and striving for something more important than the individual.²⁸ Ground soldiers often experience positive morale when they see friendly flyers over-

head. They know they are part of a team effort and have not been abandoned. The bottom line from the aircrew perspective is that positive morale leads to completed missions.

Negative morale, on the other hand, is the poor motivation, cynicism, and contempt toward leadership and unit that are detrimental to the mission. It is not a lack of drive to succeed, for that is the absence of positive morale. Rather, negative morale is the desire not to succeed—to surrender, run away, or mutiny. For example, in World War I, German ground soldiers suspected that their Luftwaffe brothers were cowardly when they did not see them airborne but saw British flyers overhead instead. Daily diaries of ground soldiers mention that while they were in the trenches with little food, members of the Luftwaffe were back in the safety of Germany eating cake and drinking coffee.²⁹ During the next world war, negative morale grew among CBO bomber crews when their chances for survival diminished. Increasing numbers of airmen reported to the flight surgeon with questionable illnesses, and animosity grew toward superiors. Bomber Command was well aware that such negative morale could spread to endanger the mission and dealt harshly with cases concerning potential negative morale.³⁰ The American side of the CBO expressed equal concern. For example, a questionable report from a retired Army officer in Sweden was circulated in 1944, claiming that to date nearly two hundred aircrews had landed in neutral countries due to “lack of moral fiber.”³¹ Not wishing to publicize the issue and in defense of his heroic airmen, Lt Gen Carl A. Spaatz became outraged at the report and subsequent inquiry.³²

One should also differentiate between negative morale and combat-stress-induced emotional breakdown.³³ Negative morale involves a willful decision to discontinue the fight or to jeopardize the mission or cause. “Emotional casualties,” however, involve people who simply lack the capability to decide at all.³⁴ Such casualties reflect an illness of the mind whereas negative morale reflects an attitude of the mind. The primary cause of negative morale is lack of confidence in leadership and

perceived disunity of purpose; the primary causes of combat stress are fatigue and fear.³⁵

[Emotional] casualties reflect an illness of the mind whereas negative morale reflects an attitude of the mind.

One might assert that negative morale does not exist or is simply the absence of positive morale, arguing that morale itself is inherently positive. Perhaps this is true from the standpoint of the dictionary definition, but in terms of military effect, one has reasons to consider the negative aspect. Comparing morale to air is a useful analogy. We need air to fly and to breathe, just as soldiers need morale to fight effectively. Using this analogy, one might say incorrectly that the absence of air—a vacuum—is negative morale. Obviously, air breathers would not fight well in a vacuum, and an aircraft will not obtain lift in a vacuum. This, however, is more accurately the absence of air—related to the absence of morale. On the other hand, what if there is no vacuum—just bad air? Now soldiers could breathe but die from poison gas, or airmen might fly but then get knocked out of the sky by excessive turbulence. The linguistic scholar may argue that negative morale simply has another name: depression, dislocation, or even “the blues.” Regardless, the important point is that the morale targeting officer recognize the conceptual difference between the positive and negative aspects of morale.

In World War II, the strategy behind morale bombing involved both positive and negative morale. Bombing Germany could boost the Allies' positive morale by satisfying desires for retribution, and it could cause negative morale in Germans, who might eventually revolt against their system and cause the German war machine to implode.

This balance between positive and negative morale, however, can rebound and have the opposite effect. For example, when air-

men are killed carrying out bombing campaigns, the unit's negative morale grows. In addition, as shown by Londoners during the blitz and by many Germans as well, bombing cities may not break civilian will and, on occasion, can even boost it. Adm Alfred Thayer Mahan was aware of such national strength when he categorized population and government types as factors in world power.³⁶ The Vietnam War is another interesting example of airpower in relation to the will of the enemy—in this case, the enemy's will to resist negotiations. From Rolling Thunder to Linebacker II, morale ebbed and flowed between the positive and the negative on both sides of the conflict, and many historians have argued that the downturn of morale on the part of Americans—or at least the stronger morale on the part of the North Vietnamese—contributed to North Vietnam's success.³⁷

We now turn to an examination of history and the way various leaders approached morale dilemmas during World War II's CBO. Lord Hugh Trenchard, head of the Royal Flying Corps in 1915 and future marshal of the Royal Air Force (RAF), prioritized morale to the extreme, stating that, in war, the "moral" was 20 times more important than the physical.³⁸ His calculation was unscientific—simply a perception of damage and accompanying numerical emphasis on morale, which he linked to the offensive doctrine that dominated tactical and strategic thinking at the time.³⁹

Critics have attacked Trenchard for his dogmatic approach to morale-oriented offensive tactics and for promoting the concept of area bombing against urban populations to break the enemy's will to resist.⁴⁰ Various writers claim that he pursued both immoral and ineffective bombing practices.⁴¹

Moral judgments vary, depending on circumstances. On the one hand, it may have been morally questionable during World War II to kill or wound 2.2 million Japanese people with aerial bombing and drive another 8.5 million to the hills by destroying their homes.⁴² Yet, for someone whose family had been brutally killed by Japanese soldiers, morality may not have been much of an issue.⁴³ On the other hand, when such use of

airpower is part of a wartime strategy of coercion or denial that fails to break the will of civilians or soldiers, the idea of attacking morale is questionable for a different reason—simple effectiveness.⁴⁴

John Keegan, in *The Face of Battle*, claims that victory is the moral collapse of the enemy.⁴⁵ Apparently, British and American air strategists of World War II agreed with that concept. Bombing to break enemy morale was part of the CBO, as stated in Casablanca's Point Blank directive: "The progressive destruction and dislocation of the German military, industrial, and economic system, and the undermining of the *morale* of the German people to a point where their capacity for armed resistance is fatally weakened. This is construed as meaning so weakened as to permit initiation of final combined operations on the continent" (emphasis added).⁴⁶

This approach to morale basically agreed with RAF Bomber Command's earlier directive issued 9 July 1941, stating that the bombing objective involved "dislocating the German transportation system and destroying the morale of the civilian population as a whole and of the industrial workers in particular."⁴⁷ On the material side, the CBO directive established intermediate, primary, and secondary objectives: Luftwaffe fighter strength, German submarine yards and bases, aircraft industry, ball bearings, oil, synthetic rubber and tires, and military motor-transport vehicles.⁴⁸ Thus, with multiple targets and objectives, the CBO was a large and complex campaign relative to the rest of the war. At its peak it involved 28,000 Allied combat planes and 1,335,000 men. Of those, many were lost in action, costing nearly a third of the total combined British and American war effort. The question of whether or not this was blood and machines well spent certainly had an overall impact on Allied morale in general—and similar questions are still pertinent to morale in today's conflicts. The difference between then and now, however, lies in the quantity behind the question. The modern aversion to casualties tends to illuminate the morale lowlight whenever one encounters a cost, human or machine, for which leadership is unable to

instill the positive perception that a compelling reason exists for such expense.⁴⁹

In retrospect, the CBO was moderately successful. It indirectly led to victory by damaging the German economy and industry; it achieved air superiority over the Luftwaffe in Europe; and it created an "indirect effect" by dislocating *Wehrmacht* efforts toward defense, making them unavailable for other purposes. It achieved its objectives of assisting indirectly with the Battle of the Atlantic and creating favorable conditions for Overlord.⁵⁰

From the standpoint of morale, however, the CBO's success in breaking the enemy's will to resist was questionable.⁵¹ Some authors have suggested that Allied and Axis aerial attacks on people showed, ironically, that civilian resolve may have been stronger than that of soldiers.⁵² Morale bombing undeniably caused significant suffering, insecurity, and lack of confidence in Nazi propaganda, but this still had no appreciable effect on behavior. *The United States Strategic Bombing Survey* concluded that "depressed and discouraged workers were not necessarily unproductive workers."⁵³ Apparently, British strategists were incorrect in assuming that the German people would be less resilient than the British.⁵⁴

Likewise, aerial bombing of similarly resilient Japanese civilians and soldiers proved to be a very difficult way to break the enemy's will. Here again, suffering and dislocation did not necessarily translate into a behavioral change, as indicated in a captured diary of a Japanese soldier who wanted some Japanese air cover against constant and "especially fierce" aerial bombardment: "Oh God, please send us some planes—even if it is only one. . . . No matter what happens, I shall live through to do my best to once again renew my spirit and my pledge. I'm not afraid of their planes, their mortars, their shelling—this is the spirit of Japan—I will fight on."⁵⁵ Against such an indomitable spirit, aerial bombing achieved only mixed success.

Thus, the morale bombing of World War II remains a contentious topic in the history of airpower.⁵⁶ Without decisively affecting the enemy's will or morale, terror bombing produced, in the words of one author, "a torrent

of destruction without precedent."⁵⁷ It also cost the lives of thousands of airmen so that 55 years after the fact, students of history are still asking if the results were worth the price.

Terror bombing was a compromise. It involved British and American domestic and political pressures for revenge in terms of offensive action, British and American incapability to bomb precisely, vulnerabilities to the bombers' crew members, and airpower theories about morale. Leaders figured that attacking enemy morale would boost waning Allied morale. Sir Stafford Cripps, Lord Privy Seal and leader of the House of Commons, had serious doubts by mid-1942 regarding British morale resulting from a perceived lack of leadership in the war effort.⁵⁸ In addition, the Americans wanted an invasion, and the Russians demanded a second front. Hence, morale bombing served as appeasement. It was also a convenient default compromise between different industrial-targeting options. For example, when conflict arose within American and British camps over targeting options such as electricity, oil, steel, and transportation, resulting directives included the lowering of enemy morale as a beneficial product of the bombing, regardless of the target option selected.⁵⁹

Morale bombing was also a product of idealistic Douhetian theory, as well as overly optimistic predictions about accuracy and effect.⁶⁰ For example, in Britain the directive of 9 July 1941 was the first to target morale specifically, linking it to transportation targets (mostly railroads in the Ruhr Valley) and basing the decision on a postulated mean bombing accuracy of six hundred yards on moonlit nights—something Bomber Command fell far short of achieving.⁶¹ In addition to such mathematical calculations, influential bombing advocates added their opinions. Trenchard wrote the following to Winston Churchill in August 1942: "For the country to get mixed up this year or next in land warfare on the continent of Europe is to play Germany's game. . . . Our strength and advantage over Germany is in the air—the British and the American Air Force."⁶² Although British and American strategic airpower theory had



Radar bombing through clouds over Bremen, Germany, on 13 November 1943

begun similarly in targeting Germany's critical industrial nodes, Bomber Command adapted to bombing inaccuracies and low aircraft survivability by switching to area industrial and urban targeting. This decision was one of political, economic, technological, and military expediency supplanting idealism.

Some historians imply that the Americans maintained higher moral ground than the British in their use of airpower. Some did. American secretary of war Newton Baker had set a tone out of World War I with a staunch stand against terror bombing, in contrast to Lord William Weir, British air minister, who didn't mind if aerial bombing burned German villages to the ground. Perhaps the most famous British area bombing advocate two decades later was Air Marshal Sir Arthur "Bomber" or "Butch" Harris. Perceiving the loss of Bomber Command's overall aim due to constantly changing target directives, Harris vehemently criticized precision bombing of industrial bottlenecks as "panacea" bombing.⁶³ One should keep in mind, however, that many Americans' perspective of World War II had not been tempered with firsthand experience of two morale issues. One, the bomber did *not*, as Prime Minister Stanley

Baldwin had proclaimed, always get through (or those that did sustained heavy damage and loss of life). Two, the Germans had done it first with *Luftstreitkräfte* terror bombing of London. Harris's approach evolved into a single-minded desire and determination to kill German workers and disrupt German society.⁶⁴ He became committed to this cause and in some respects may have implemented the CBO directive incorrectly according to that commitment.⁶⁵ When challenged by superiors, Harris offered his resignation.

Harris had not been a terror-bombing disciple from the beginning but, like many others in Bomber Command, switched reluctantly and gradually to area attack—not wishing to do the wrong thing for the right reasons. Morale bombing had made sense on paper from a deterrence standpoint, and many RAF leaders believed that "moral collapse was the most likely outcome of bomb attack."⁶⁶ Yet, to employ it was another issue. During the Spanish Civil War, RAF air marshals had witnessed poor success against morale from German aerial attacks on Madrid as well as Italian attacks on Barcelona. Official RAF doctrine established in Air Pamphlet 1300 listed only military targets.⁶⁷

Hence, one argument maintains that Harris and his command did not choose to switch to morale bombing but that they were forced into it due to technological limitations and political expediency.⁶⁸ It was the only way to fulfill the RAF's traditional *raison d'être*—Trenchard's aerial offensive dictum of bombing the enemy harder. As a result, approximately three hundred thousand German civilians died due to aerial attacks, a figure some people use to condemn CBO failure rather than to substantiate success.⁶⁹

Harris and Bomber Command, however, were not singly responsible for the expediency decision and its effects. For the most part, the American decision for daylight precision bombing of industries was a matter of practicality more than morality.⁷⁰ General Spaatz was against bombing cities, not so much due to personal conviction of conscience but because he thought it was less efficient and effective than bombing the Luftwaffe and oil. This approach was in concert with the original American force-structure plan known as Air War Plans Division—Plan 1 (AWPD-1), developed by former Air Corps Tactical School instructors.⁷¹ Also, American bombing in 1945 against both Germany and Japan was as much terror bombing of civilians as any conducted by Bomber Command. Furthermore, one should remember that the Americans agreed to British area bombing as part of the CBO. Finally, like the British, the Americans also moved toward area bombing due to "circumstances well beyond control of the Army Air Forces."⁷² Eighth Air Force dropped as many tons of bombs on ball-bearing manufacturing via area bombing as by "pickle barrel" bombing, with full knowledge of the collateral damage. American high-altitude daylight precision bombing was often no more precise than British area bombing at night.⁷³

Ironically, near the end of the war, the Americans and British were switching sides. By late 1944 and early 1945, Bomber Command accuracy, Allied air superiority, and bomb development led the British Air Staff to reconsider selective targeting, while the newly designated United States Strategic Air Forces were seriously pursuing "psychological bomb-

ing," as evidenced by the attacks on Berlin and Dresden in February 1945.⁷⁴ As one author notes, "Certainly any distinction between American and British practices was lost upon the citizens of Dresden, Chemnitz and Berlin after visitations by the 8th Air Force in February 1945."⁷⁵ The late shift in targeting, perhaps not incidentally, coincided roughly with American firebombing of Japanese cities—initiated for different reasons but area bombing of urban populations just the same.

Ironically, Bomber Command morale rose when Harris took command in May 1942, despite the fact that casualty rates immediately jumped from 3.7 to 4.3 percent. Harris knew that 4 percent was his break-even point for replacements to offset losses, and this led to his decision to switch to 80 percent area bombing at night.⁷⁶ In essence, then, the morale-bombing decision was for morale purposes—positive for his men and negative for his enemy.

Harris's American counterpart was General Spaatz, commander of Eighth Air Force.⁷⁷ Like Harris, Spaatz also experienced morale difficulties due to wastage rates, a problem he approached with tenacity. Spaatz had learned the hard way how not to try to boost positive morale. His plan of providing crews leave in the United States, after which they had to return to fight, proved counterproductive and was terminated. The best he could hope for was simply giving aircrews the perception of a reasonable probability of survival while ensuring mission accomplishment. Spaatz made the mission his first priority but tried to keep crews hopeful that they could survive the 25 combat missions necessary to accomplish the mission.⁷⁸

Spaatz appears to have kept his compassion for the troops mostly to himself and was not noted for charismatic pep talks. Instead, he believed that the most effective way to deal with morale was simply to let flyers know exactly where they stood. In this regard, he fought to make them believe in themselves and their positive effect on the war: "Our most important job just now is keeping up morale of these boys who are doing the fighting, and only by convincing them with facts can we prove to them that the results ob-

tained are worth the effort they are putting into the job.”⁷⁹ This clearly is an example of the leadership-discipline-confidence linkage to morale discussed earlier.

Personal courage and mission first—that was how Spaatz approached morale.

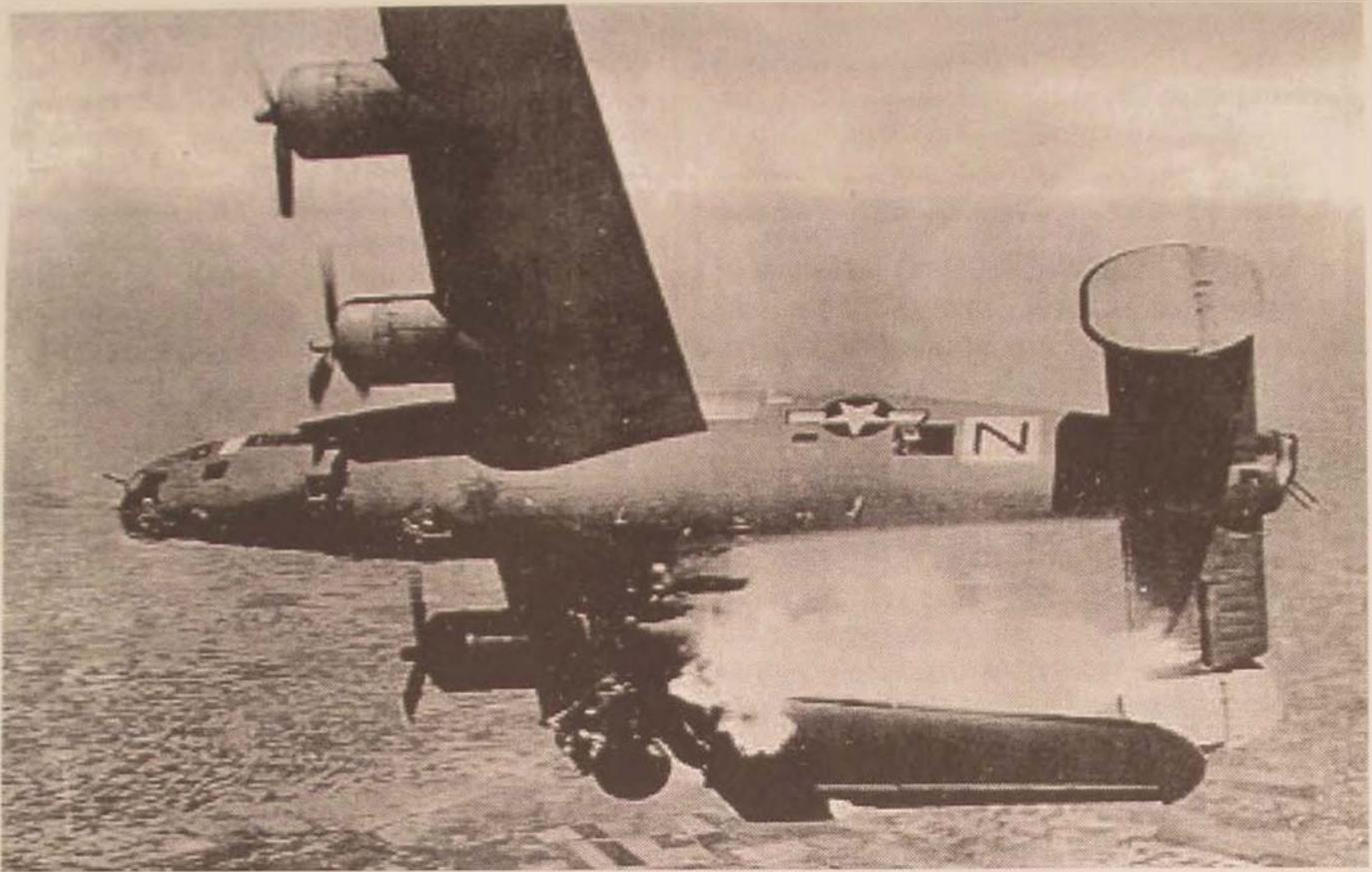
Finally, Spaatz was a doer rather than a preacher, which, according to S. L. A. Marshall, is important.⁸⁰ He says that a non-doer leader is like religion without works—soulless. In Spaatz’s case, no doubt his troops were aware that the general who was commanding them had flown through many dangers himself, had shot down enemy aircraft in World War I, and had set world records through personal courage in the air. Personal courage and mission first—that was how Spaatz approached morale.

The most notable CBO aspects affecting morale were the dangerous missions and the devastating firebombing. For example, Operation Gomorrah against Hamburg in summer 1943 was true terror bombing aimed to achieve negative German morale.⁸¹ On the other hand, as German night-fighter developments offset the British safety factor of night operations, losses incurred during the area bombing of Berlin six months later served to damage the positive morale of Bomber Command’s crews. The Americans also paid the price in lives with elusive success against key industrial nodes. On the Schweinfurt raids of 17 August and 14 October 1943, the unescorted bomber was clearly not as invulnerable as Gen Ira Eaker had predicted.⁸² No doubt, fighter escorts such as P-51 Mustangs were a huge morale boost to bomber crews on operations like Argument—popularly known as “Big Week” during February 1944. Even the unofficial escort name “little friends” connotes such positive morale.⁸³ Thus, at the risk of oversimplification, morale in the CBO was a bit like a teeter-totter: a rise in positive morale on one side could eventually affect negative morale on the other.

In a sense, a similar moral stage was set at sea, where the urban city was replaced by the merchant ship. Just as civilians in cities were integral to Germany’s war-fighting production, so were civilian sailors helping to resupply British and American war fighters. The Germans gravitated to unrestricted submarine warfare as they had done during the previous world war, attacking sea-lanes of communications and threatening “the survival of Great Britain and its postwar freedom of action as a great power.”⁸⁴ Similar to Bomber Command’s expediency to engage in aerial area bombing, it was also safest and most practical for German U-boat commanders to attack lone merchant ships without warning or attack convoys at night using Adm Karl Dönitz’s *Rudeltaktiken* (wolf-pack tactics).⁸⁵ Similarity between aerial and sea activities is less important than the fact that both situations heavily involved morale. Torpedoes, cold water, and sharks were terrifying to American sailors, just as anti-aircraft flak and Luftwaffe fighters were to the bombers’ crew members. From a more strategic perspective of morale in terms of economy and national survival, British prime minister Churchill noted that the only thing that really frightened him during the war was the U-boat peril.⁸⁶

The CBO and the aerial bombing of Japanese cities were moderately successful campaigns of materiel exhaustion in which Allied operations succeeded in outlasting the enemy. In that sense, then, they were also campaigns of morale attrition. On the morale side, however, the campaigns were less successful. According to the recently declassified and published findings of the British Bombing Survey Unit, “in so far as the offensive against German towns was designed to break the morale of the German civilian population, it clearly failed.”⁸⁷

The Air Force today lives with the legacy of World War II’s bombing campaigns, both positively and negatively. The harshest critics posit various racial attitudes and conspiracy theories behind terror bombing; others argue that bombing was the manifestation of parochial interests to win the war for air-power more than to win the war itself.⁸⁸ One



Direct hit by flak: B-24 of the 464th Bomb Group destroyed on 9 April 1945

argument holds that damage and destruction counted, regardless of the effect, so the CBO was tailored to burn and destroy. The important fact for today, however, is that the situation has been reversed. American expectations now are that the Air Force must perform with precision and effect. This is a positive improvement in American aerial warfare, despite the potential inability to meet expectations should they become unrealistic. Still, perhaps the greatest difficulty is achieving expectations regarding morale.

This article argues that realistic expectations about targeting morale need to reflect an understanding of morale's complex and critically important role in war. As CBO planners learned, one cannot assume that bombing enemy targets like oil, electricity, and transportation systems will also, as a default, affect as desired an abstract target like enemy morale. Before air campaign planners target morale as part of a war-winning strategy, they should consider it in both its positive and

negative realms, as well as in its relationship to leadership and discipline. Despite quantum improvements in technologies, organization, and thinking since the time of World War II's CBO, some things remain the same. War is still hell, and the challenge of bombing to maintain or destroy morale is monumental.

World War II's CBO was successful in setting the stage for the success of Overlord, but the terror bombing of civilians was not very successful. As a strategy, it caused negative morale among bomber crews, and it failed to target the *Schwerpunkt* of German morale, just as firebombing Japanese cities failed to break the Japanese will to resist. Why then did Allied decision makers go for the terror-bombing option? There are many plausible reasons: desire for revenge and "eye-for-an-eye" retribution, inability to do anything else while facing a daunting enemy and a very uncertain future, perceived opportunity to prove the *raison d'être* of the air forces, avoidance of friendly ground casualties, and belief that it would

break enemy will. All of these and other reasons aside, the important point for today is knowing that targeting morale requires precise aerial bombing of C² and leadership to

As CBO planners learned, one cannot assume that bombing enemy targets like oil, electricity, and transportation systems will also, as a default, affect as desired an abstract target like enemy morale.

disrupt the linkage among leadership, morale, and organization success. Damaging a populace's living conditions may not break its will to resist unless carried to the morally questionable extremes of killing most of the people or completely destroying their ability to survive. At the time of the CBO, such apparent ruthless retribution as part of a strategy was more understandable to decision makers and Allied societies than it is to students of history who have not lived through the blitz and faced such an enormous task and uncertain outcome. Yet, with contemporary capabilities to do precision strikes, such terror uses of airpower are now unacceptable—for the United States at least. On the other hand, destroying enemy perceptions of their unity of purpose in order to cause collapse of moral force may still be a feasible strategy.

Most likely that strategy will continue to be exacted in a CBO-type operation. The practice of combining Allied aerial bombing forces began in World War I, was cemented in World War II, and has continued since. A more recent and successful CBO took place after the 1990 Iraqi aggression against Kuwait aroused coalition efforts against Saddam Hussein's C² centers, early warning systems, selected industries, Scud missile sites, and Republican Guard forces. The Gulf War CBO, again involving allied day and night aerial bombing, successfully dislocated the enemy with much greater precision than in the past. Area bombing still had its place in the CBO, with B-52 carpet bombing on the Republican

Guard. This, however, was confined to soldiers and was effective in destroying their will to resist. According to Gen Chuck Horner, the joint force air component commander of the Gulf War, "there is powerful evidence from the 88,000 POWs that air's most significant impact on Iraqi fighting strength was the destruction of morale."⁸⁹ In this respect, airpower was much more decisive in affecting one of the foggiest factors of war.

Even more recently, aerial campaigns over the former Yugoslavia were again CBOs—this time under the direction of the North Atlantic Treaty Organization (NATO). Likewise, these CBOs clearly involved morale as well, which became increasingly complex due to various so-called Cable News Network factors such as displaced millions of people and other results of ethnic cleansing. Again the enemy's morale center of gravity was difficult to target when it could not be isolated and was complicated by the fact that Serbia had a long history of resilience to negative morale factors. Perhaps for this reason, NATO air-to-ground targets reflected an objective to destroy Yugoslavia's infrastructure that supported its military, rather than attacking strategically from the start against leadership C². The idea was not to target morale but just the opposite: to deprive Slobodan Milosevic of the capability to pursue ethnic cleansing even if he still had the will to do it. It was a straitjacket strategy and in many respects once again became a process of attrition and exhaustion. As author William Arkin notes, "We won through sheer repetition,"⁹⁰ causing Milosevic eventually to discontinue the fight and leave Kosovo. Air superiority and aircrew confidence promoted morale among the NATO coalition, and the collateral damage to civilians was a miniscule fraction of that witnessed in World War II. What went into Milosevic's eventual decision to leave can only be surmised at this point, but perhaps it was knowing that NATO could hit pretty much with impunity what, where, and when it wanted, and that he could do nothing to stop it except pull out. The complete reality of what happened in Kosovo is still largely unknown and now under intense study, hope-

APPENDIX C

QUESTIONNAIRE FOR FOREIGN WORKERS

Questionnaire for French Workers
(Italian)
(Russian)

Age ----- Married
Sex ----- or Single
Home in France -----
(Russia) ----- department
(Italy) -----

To answer the following questions
please mark an X in the proper square

1. What schooling have you had
primary ()
secondary ()
2. In what way did you work in Germany?
Drafted laborer ()
Substitute for prisoner ()
Transformed prisoner ()
Volunteer ()
Political deportee ()
War Prisoner ()
3. In what cities did you work?
----- from ----- to ----- Employment -----
----- from ----- to ----- Employment -----
----- from ----- to ----- Employment -----
4. How many raids did you experience in Germany?
Please give us the dates of the heaviest bombardments.
----- date -----
----- date -----
----- date -----
5. Were you ever wounded during a raid? Yes () No ()
Were your lodgings damaged? Yes () No ()
Were your possessions lost? Yes () No ()
Were any of your friends wounded? Yes () No ()
Were any of them killed? Yes () No ()
6. Did the first raid surprise you? Yes () No ()
or
Did you expect to be bombarded? Yes () No ()

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22. Before the invasion of Germany by the Allies, did you witness any looting during a raid? Yes () No ()
Were the looters Germans () or were they foreigners ()
23. Was the black market affected by the raids? Increased ()
Diminished ()
Unchanged ()
24. Did you witness the evacuation of German civilians? Yes () No ()
Were these evacuations voluntary () or forced () or both ()
Where these evacuations well organized () or badly organized ()
Did the evacuation of their families affect the Germans who remained?
They were glad to know them in safety ()
Disturbed to be separated from them ()
Not affected ()
If you were in a region where evacuees were received, how did they get along with their hosts? Well () Badly ()
25. Did the bombings have any effect on the attitude of the German people toward the Nazi Party?
They blamed it for having begun the war ()
They blamed it for not having protected the cities ()
They became still more dependent on the party ()
Their attitude remains unchanged ()
26. Before the invasion of Germany by the Allies, did any of the Germans that you knew come to the point, as a result of the bombings, to think that they could not continue the war?
Yes ()
No ()
Please give a brief explanation. -----

27. Before the invasion of Germany by the Allies, did any of the Germans confide in you that they feared that Germany was going to lose the war?
Yes ()
No ()
28. Why have the Germans continued their efforts to the very end, in spite of the raids?
Character of the German people ()
Their education by the Nazi Party ()
Governmental controls (police, S. S., etc.) ()
Fear of what an Allied victory would bring them ()
Other reasons ()
29. Have you ever read any leaflets dropped by airplane?
Yes ()
No ()
Where they written especially for foreigners ()
Were they destined for Germans ()

Two pages from a questionnaire given to more than two thousand foreign workers during the Allies' occupation of Germany—part of an attempt to assess both the physical and psychological damage caused by Allied bombing. (From United States Strategic Bombing Survey, vol. 2 [New York: Garland, 1976], appendix C)

fully to shed more light on the dilemma of targeting and enemy morale. If nothing else, Kosovo reinforced the fact that morale is difficult to understand and predict.

The many facets of the morale outlook for the US Air Force show improvement as well as a warning. On the one hand, in the future, the added predictability provided by the Aerospace Expeditionary Force management concept will provide deployed aircrews valuable light at the end of the tunnel—critical for positive morale. On the other hand, force-protection concerns and increased casualty aversion can be morale choke points and must be perceived realistically. Americans may find themselves increasingly on the re-

ceiving end of morale targeting in the form of terrorism. It is not simply coincidence that terror bombing and terrorism share the same root word, for by its very nature, terrorism generally involves indirect attack on morale.

The good news is that American terror bombing of civilians is history—it has gone the way of pikes and muskets. We should not, however, pat ourselves on the back for being more moral than our Air Force predecessors. Our technology has simply allowed us to act more morally. With incredibly reduced circular errors of probability from munitions guided by our Global Positioning System and the national commitment to use such expensive weapons, we may now finally have the ac-

curacy to target morale from the air without directly killing many civilians. Yet, despite impressive abilities to halt enemies in their

tracks anywhere and anytime, targeting morale will probably still take more time than we would like. It is part of the fog of war. □

Notes

1. Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (London: Oxford University Press, 1963), 54.
2. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), 185. See also Mark K. Wells, *Courage and Air Warfare: The Allied Aircrew Experience in the Second World War* (London: Frank Cass, 1995), 213. Wells states that "it would be a terrible mistake for future commanders and medical officers to overlook the human dimension of the Combined Bomber Offensive."
3. Certainly, not all area bombing involves targeting morale under the label "terror" bombing, but for purposes of this study of the Combined Bomber Offensive, the terms are synonymous.
4. *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, N.J.: Princeton University Press, 1986), 407, 521.
5. US Office of Information for the Armed Forces, *The Armed Forces Officer*, DOD GEN-36 (Washington, D.C.: Armed Forces Information Service, Department of Defense, 1975), 129.
6. Dale O. Smith, "What Is Morale?" *Air University Quarterly Review*, Winter 1951-1952, 44.
7. *The Armed Forces Officer*, 136.
8. *Ibid.*, 129.
9. *Ibid.*, 130.
10. Clausewitz, 103-4.
11. *The Armed Forces Officer*, 131.
12. *Ibid.*, 133.
13. *Ibid.*, 135.
14. Wells, 137.
15. Clausewitz, 100-101, 104. Clausewitz discusses the concept in terms of levels of development of civilized societies and relates genius in command with those degrees of development. The commander is integral to unit morale and strength of will.
16. Smith, 44. The nine components are awareness of objectives, agreement with objectives, faith in attainment of objectives, realistic picture of job ahead, determination to achieve objectives, confidence in leadership, satisfaction with progress toward objectives, extent of unification, and feelings of usefulness in contribution to objectives.
17. *Ibid.*, 43.
18. Edward R. Gilbert, "Human Factors in Strategy—The National 'Will to Fight'" (Maxwell AFB, Ala.: Air War College, April 1960), 1-3, United States Air Force Historical Research Agency (hereinafter AFHRA), Maxwell AFB, Ala., K239.042-1754.
19. Tami D. Biddle, "British and American Approaches to Strategic Bombing," *Journal of Strategic Studies*, March 1995, 128.
20. Conrad C. Crane, *Bombs, Cities, and Civilians: American Airpower Strategy in World War II* (Lawrence, Kans.: University Press of Kansas, 1993), 14.
21. H. P. Willmott, *The Great Crusade: A New Complete History of the Second World War* (New York: Free Press, 1989), 82.
22. *Ibid.*, 87.
23. A contemporary example of collapsing morale was the surrender of thousands of Iraqi Republican Guard soldiers following B-52 carpet bombing during the Gulf War of 1991.
24. Willmott, 142.
25. See Gilbert.
26. Steven Collins, "Army PSYOP in Bosnia: Capabilities and Constraints," *Parameters* 29, no. 2 (Summer 1999): 58. Collins argues that PSYOP has suffered from being stuck in a rut of traditional uses of leaflets and loudspeakers when television is overwhelmingly more effective today.
27. Crane, 18-24, provides an excellent discussion of this de Seversky thesis relative to the myriad other ideas of indirect attack against civilian morale that influenced Air Corps Tactical School thinkers and American air strategists.
28. Wells, 119, 211; and *The Armed Forces Officer*, 132.
29. German Documents, Trenchard Papers, MFC 76/1/73, Royal Air Force Museum, Hendon, United Kingdom.
30. Wells, 197.
31. Maj Gen F. L. Anderson (for Spaatz) to Arnold, letter, 29 July 1944, AFHRA, 622.1621-2.
32. Wells, 108-9.
33. *Ibid.*, 89. Historians have suggested that *morale* was a term "used and abused" in wartime to denote a variety of different combat-related symptoms that were detrimental to the mission.
34. Wells uses the term *emotional casualties* as a result of combat stress (page 61).
35. *Ibid.*
36. A. T. Mahan, *The Influence of Sea Power upon History, 1660-1783* (Boston: Little, Brown and Co., 1918), 44-50, 56-57.
37. George C. Herring, *America's Longest War: The United States and Vietnam, 1950-1975* (New York: McGraw-Hill, Inc., 1996), 186, 204, 304; Mark Clodfelter, *The Limits of Airpower: The American Bombing of North Vietnam* (New York: Free Press, 1989), 149; and Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, N.Y.: Cornell University Press, 1996), 210.
38. Pape, 61; and Crane, 17.
39. Eric Ash, *Sir Frederick Sykes and the Air Revolution, 1912-1918* (London: Frank Cass, 1999), 104-5.
40. P. R. C. Groves, "This Air Business," 25-26, Groves Papers, box 3, Liddell Hart Centre for Military History, King's College, London.
41. Some of Trenchard's harshest critics have been David Davine, P. R. C. Groves, H. R. Allen, and Frederick Sykes.
42. Raymond S. Sleeper, "Air Power, the Cold War, and Peace," *Air University Quarterly Review*, Winter 1951-1952, 7.
43. Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, Conn.: Yale University Press, 1987), xi. In his sociological study of airpower, one of Sherry's main themes is that "racial antagonisms" fueled American decisions to bomb civilians. Yet, very likely race had nothing to do with much of the motivation. It was simply reaction to overt aggression, regardless of race.
44. Pape's *Bombing to Win* provides an excellent analysis of coercive air strategies in relation to civilian and military morale.
45. John Keegan, *The Face of Battle* (New York: Viking Press, 1976), 302.
46. United States Strategic Bombing Survey, *The United States Strategic Bombing Survey: Summary Report (European War) September 30, 1945* (Washington, D.C.: Government Printing Office, 1945), 1, vi (hereinafter USSBS).
47. British Bombing Survey Unit, *The Strategic Air War against Germany, 1939-1945: Report of the British Bombing Survey Unit* (London: Frank Cass, 1998), 5 (hereinafter BBSU).
48. Williamson Murray, *Strategy for Defeat: The Luftwaffe, 1933-1945* (Maxwell AFB, Ala.: Air University Press, 1983), 170; and Anthony Verrier, *The Bomber Offensive* (London: B. T. Batsford, Ltd., 1968), 160.

49. Eric V. Larson, *Casualties and Consensus: The Historical Role of Casualties in Domestic Support for U.S. Military Operations*, RAND Paper MR-726-RC (Santa Monica, Calif.: RAND, 1996), xix.
50. USSBS, 24, 32.
51. "Impact of Air Attack in World War II: Selected Data for Civil Defense Planning," vol. 1, Stanford Research Institute, 1953, 3; and USSBS, 95.
52. Hans Rumpf, *The Bombing of Germany*, trans. Edward Fitzgerald (New York: Holt, Rinehart and Winston, 1962), 214.
53. USSBS, 97, 99.
54. Biddle, 102.
55. "Daily Intelligence Extracts for 26 Feb 1945," AFHRA, 830.639-1.
56. W. Hays Parks, "Air War and the Laws of War," in *The Conduct of the Air War in the Second World War: An International Comparison*, ed. Horst Boog (Oxford: Berg Publishers, Ltd., 1992), 355; and David MacIsaac, *Strategic Bombing in World War II: The Story of the United States Strategic Bombing Survey* (New York: Garland Publishing, 1976), xxi. Other concise assessments of the historical morality debate are in Crane, 1-11; Sherry, 15, 173-76; and Wells, 1.
57. Alan J. Levine, *The Strategic Bombing of Germany, 1940-1945* (Westport, Conn.: Praeger Publishers, 1992), 1.
58. Winston S. Churchill, *The Hinge of Fate* (Boston: Houghton Mifflin Co., 1950), 554.
59. *The Strategic Air War against Germany*, 2, 24. Although Bomber Command had plans aimed specifically at morale—such as W.A.8 and Hurricane 2—in general, morale remained an overarching abstract target that fit almost any plan to some degree.
60. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (1942; new imprint, Washington, D.C.: Office of Air Force History, 1983), 20; and Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force*, vol. 1, 1907-1960 (Maxwell AFB, Ala.: Air University Press, December 1989), 78-82. Theorists included Brig Gen Giulio Douhet, Lord Hugh Trenchard, Maj Gen Sir Frederick Sykes, and Lord William Weir.
61. *The Strategic Air War against Germany*, xxvii, 5. The Cabinet Office's "Butt Report" condemned Bomber Command's accuracy by showing that only 10 percent of the aircraft actually bombed within five miles of the target.
62. Churchill, 551.
63. *The Strategic Air War against Germany*, xxvii; and Levine, 37.
64. Biddle, 124.
65. British airpower historian Sebastian Cox's savvy perspective of Harris relative to his wartime Bomber Command situation as well as complications from weather and other factors is a helpful counterbalance to the traditional condemnation Harris has received in the historiography. See *The Strategic Air War against Germany*, xxvii.
66. R. J. Overy, "Air Power: Historical Themes and Theories," in *The Conduct of the Air War in the Second World War*, 25.
67. Phillip S. Meilinger, "Trenchard and 'Morale Bombing': The Evolution of Royal Air Force Doctrine before World War II," *The Journal of Military History* 60 (April 1996): 258; James S. Corum, "From Biplanes to Blitzkrieg: The Development of German Air Doctrine between the Wars," *War in History* 3 (1996): 98; and Rumpf, 214.
68. Biddle, 115.
69. Olaf Groehler, "The Strategic Air War and Its Impact," in *The Conduct of the Air War in the Second World War*, 291-93; Rumpf, 229-33; and Levine, 190. One should note that casualty figures are widely different, ranging from over five hundred thousand to half that amount, depending on the source. According to the USSBS, the numbers are closer to 305,000 killed and 780,000 wounded (page 21).
70. Crane notes that neither President Franklin Roosevelt nor Gen Henry "Hap" Arnold "had any aversion to terror bombing when it suited their purposes" (page 6).
71. David R. Mets, *Master of Airpower: General Carl A. Spaatz* (Novato, Calif.: Presidio Press, 1988), 114; and Crane, 22-26. At the Air Corps Tactical School, the debate about targeting industry or civilians went round and round to eventually end up in AWPD-1 with a decision to refrain from bombing population centers unless necessary as a final death blow—and only when the proper psychological circumstances existed.
72. USSBS, 27.
73. Stephen L. McFarland, *America's Pursuit of Precision Bombing, 1910-1945* (Washington, D.C.: Smithsonian Institution Press, 1995), 184-90; W. Hays Parks, "'Precision' and 'Area' Bombing: Who Did Which, and When?" *Journal of Strategic Studies* 18, no. 1 (March 1995): 145-74; Biddle, 123-25; and Crane, 9.
74. Biddle, 123-25.
75. Willmott, 415.
76. Martin Middlebrook and Chris Everitt, *The Bomber Command War Diaries: An Operational Reference Book, 1939-1945* (London: Penguin Books, 1985), 296.
77. Eventually, Spaatz became commander of United States Strategic Air Forces in Europe.
78. Mets, 185-86.
79. Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington, D.C.: Office of Air Force History, 1993), 384.
80. *The Armed Forces Officer*, 136.
81. Norman Longmate, *The Bombers: The RAF Offensive against Germany, 1939-1945* (London: Hutchinson & Co., Ltd., 1983), 261-63.
82. USSBS, 5.
83. Davis, 360.
84. Kent Roberts Greenfield, *American Strategy in World War II: A Reconsideration* (Baltimore: Johns Hopkins University Press, 1963), 3.
85. Keegan, 110; and Willmott, 64.
86. Keegan, 104. Perceived angst over the Battle of the Atlantic may have been worse than the reality according to Clay Blair, in *Hitler's U-Boat War*, vol. 2, *The Hunted, 1942-1945* (New York: Random House, 1996). See also William L. O'Neill's review of Blair in *Strategic Review* 27, no. 2 (Spring 1999): 59.
87. *The Strategic Air War against Germany*, 79. The difficulty of assessing CBO success involves anecdotal and indirect measurement. The BBSU report on morale is based largely on economic assessment, drawing the conclusion that failure to break production meant failure to break morale. This was problematic, considering the fact that the economic assessment was swayed by a distorted German war-economy report written by Dr. Rolph Wagenfuehr. The USSBS included interviews of thirty-eight hundred people who had suffered various degrees of war weariness.
88. Pape, 93.
89. Tom Clancy with Chuck Horner, *Every Man a Tiger* (New York: G. P. Putnam's Sons, 1999), 469.
90. William Arkin, "Air Power Has Set 'New Standard for Warfare,'" *Air Force Times*, 12 July 1999, 12.

Air Strategy

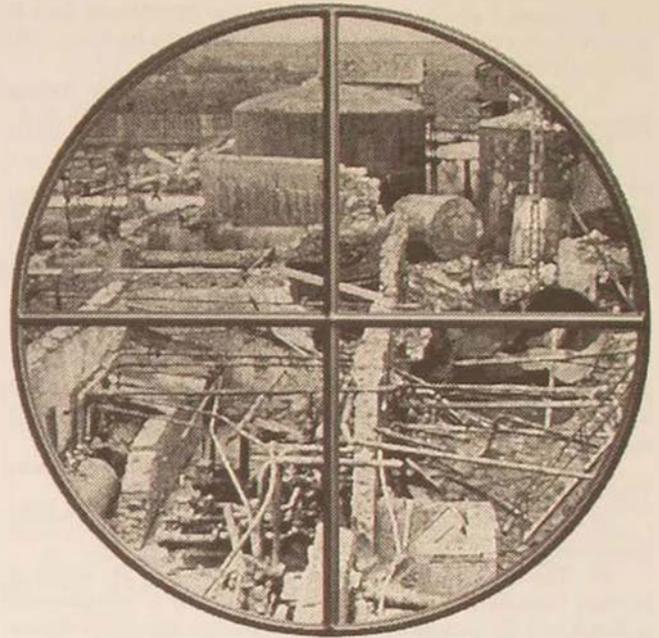
Targeting for Effect

COL PHILLIP S. MEILINGER, USAF

AIRMEN HAVE ALWAYS believed that the airplane is an inherently strategic weapon. Airpower, operating in the third dimension, can bypass the tactical surface battle and operate directly against the centers of gravity (COG) of an enemy nation: the industrial, political, economic, and population loci that allow a country to function. However, airpower theorists have differed significantly over which specific targets should be struck or neutralized so as to achieve the greatest results. We must understand the various air-targeting strategies because they collectively define the boundaries of strategic-airpower thought, and they clarify the connection between the air weapon and its role in war. Moreover, understanding these concepts leads to a more balanced and flexible grasp of air strategy and the factors that go into its determination.

Psychologists tell us that the most traumatic event in one's life is birth. If so, the birth of airpower was doubly traumatic because it occurred in concert with World War I. That war smashed empires, spawned dictatorships, caused the deaths of at least 10 million people, and had a profound effect on the conduct of war. The loss of a generation of European men, as well as over one hundred thousand Americans, convinced military leaders that tactics and strategy had to be altered. Radical solutions, therefore, received greater consideration than would ordinarily have been the case. Airpower was one of those radical solutions.

When a country wishes to influence another, it has several instruments at its disposal—the military, economic, political, and psychological “levers of power.” Depending on a country's objectives, it can employ these



levers against another country. For example, if the objective is to express displeasure over a dictator in country A who oppresses his people, then country B may impose sanctions—use of the economic lever of power—in an attempt to modify his noxious behavior. Country B may also petition the United Nations to condemn the dictator and turn world opinion against him—use of the political and psychological levers of power. Obviously, as things become increasingly serious, the military lever becomes most prominent.

These levers of power are directed against an enemy's COGs, which can be the strengths of a country—perhaps the army or the industrial infrastructure—but they can also be a vulnerability. One must recognize this distinction. In attempting to bend an enemy to our will, attacking him at the strongest point is not always necessary or desirable; rather, we should hit him at his weakest point if that will cause collapse. Thus, a country's strength may be its navy, but its weakness may at the same time be dependence on sea-lanes that provide food and raw materials. In such an instance, a strategist may wish to avoid the enemy's strength while simultaneously attacking his weakness. This is analogous to the sit-

uation in World War I, when the German surface fleet remained in port in fear of the Royal Navy, while German submarines carried out a highly effective campaign against British merchant shipping. One can loosely group the generic COGs of a country into the categories of military forces, the economy, and the popular will (table 1). In sum, strategy consists of employing levers of power against the enemy's COGs.

Table 1

Levers of Power and Generic Centers of Gravity

Levers of Power	Generic COGs
<ul style="list-style-type: none"> • Military • Economic • Political • Psychological 	<ul style="list-style-type: none"> • Forces • Economy • Will

Traditionally, armies have used the military lever of power to operate against an enemy's military forces (fig. 1). This was due, quite reasonably, to the fact that the other COGs within a country were protected and shielded by those military forces. As a consequence, war became a contest between armed forces; the losers in battle exposed their country's COGs to the victor. Usually, actual destruction or occupation was unnecessary: with the interior of the country exposed and vulnerable, the government sued for peace. Although land actions could also have an effect on the enemy's economy or will—depicted in figure 1 by the thinner arrows—such consequences were usually indirect and often unplanned. Small wonder that military theorists over time equated the enemy army with the main COG because when the army fell, so did resistance.¹ As noted, however, World War I demonstrated that such attritional contests had become far too bloody—for both sides—to serve as a rational instrument of policy. Soldiers sought a solution, but sailors and airmen took totally different approaches.

Sea warfare is fundamentally different from war on land. Navies have difficulty impacting

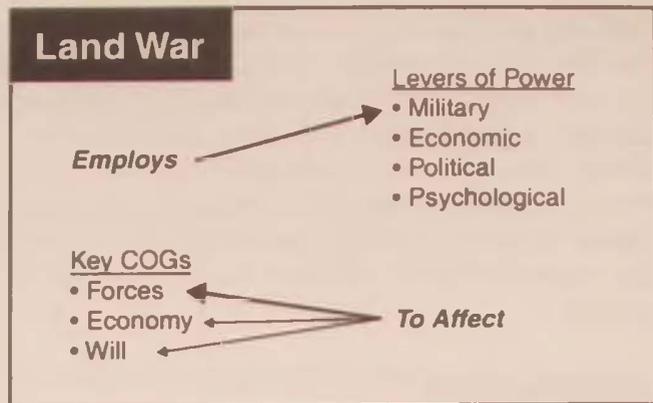


Figure 1. Land War

armies or events on the ground directly, so they have traditionally relied on a form of economic warfare—exemplified by blockades, embargoes, and commerce raiding—to achieve their war aims. Thus, although navies do indeed fight other navies, for the most part they use the economic and psychological levers of power against an enemy's economy and will (fig. 2). Blockade and commerce raiding deprive a country of the food and raw materials it needs to carry on the war effort. Over time, the people begin to suffer the effects of prolonged starvation, and their will to continue the war dissipates.

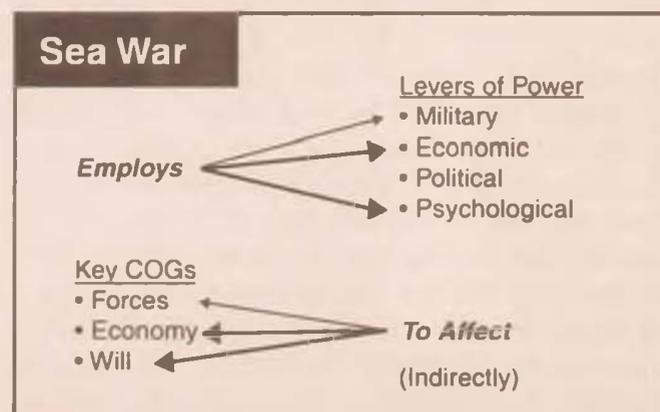


Figure 2. Sea War

Air war, in turn, is fundamentally different from both land and sea warfare. Airmen have always recognized that the airplane's ability to operate in the third dimension gives it the unique capability to strike all of an enemy's COGs. Moreover, although airpower operates

against the enemy's economy and will—as do navies—it does so *directly* (fig. 3). Navies block or sink ships at sea carrying raw materials to a smelting plant that turns those materials into steel, which is then transported to a factory that turns it into weapons. Aircraft can strike those factories and weapons directly. Indeed, an enemy's entire country becomes open to attack.

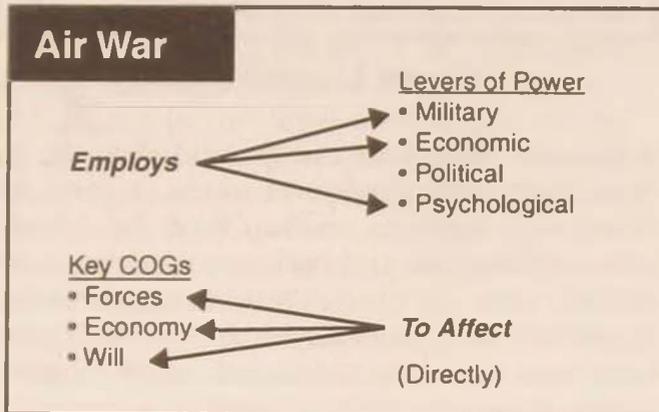


Figure 3. Air War

This, however, tends to complicate things for the air strategist. Obviously, airmen must become intimately familiar with the inner workings of an enemy nation. Knowing that a country depends on its railroads, canal system, political leaders, steel mills, electrical power grid, arable land, telephone system, chemical factories, and so forth is of limited practical value because not all of these targets can be attacked. Which COGs are the *most* important? Selecting the correct targets is the essence of air strategy. However, the fact that something can be targeted does not mean it is valuable, and a thing that is valuable is not necessarily targetable. Perceptive air planners realize that destruction of target sets does not automatically equate to victory; further, intangible factors such as religion, nationalism, and culture are no less important in holding a country together during war than are its physical attributes. The situation has become even more complex with the introduction of a host of "new targets" critical to the functioning of a modern state: fiber-optic networks, communications satellites, nuclear

power plants, and the new electronic medium often referred to as "cyberspace," which plays an increasingly important role in all aspects of personal and professional life. How is a modern airman to sort it all out? A schematic representation of a modern country illustrates the problem and may also point to a solution (fig. 4).

The key to all war is the amorphous and largely unquantifiable factor known as the "national will." It occupies the central place in the schematic because it is the most crucial aspect of a country at war. At its most basic, war is psychological. Thus, in the broadest sense, national will is always the key COG—when "the country" decides the war is lost, then and only then is it truly lost. However, that really says very little. The obvious challenge for the strategist is to determine how to shatter or at least crack that collective will. Because it is an aggregate of so many different factors and because it has no physical form, attacking national will directly is seldom possible. Rather, one must target the manifestations of that will. In a general sense, those manifestations can be termed "military capability."

Military capability is the sum of the physical attributes of power: land, natural resources, population, money, industry, government, armed forces, transportation and communications networks, and so forth. When these things have been dissipated or destroyed—when there is no effective capability left with which to fight—then the national will either expires or becomes unimportant. Thus, in the schematic presented here, military capability is closely tied to national will. By the same token, because military capability is at the center of a nation's being and is the sum of a country's total physical power, it is extremely difficult to destroy entirely. The key lies in selectively piercing this hard shell of military capability in one or several places, thereby exposing the soft core. Through these openings, one can puncture, prod, shape, and influence the national will. In most cases, will collapses under such pressure before capability has been exhausted.²

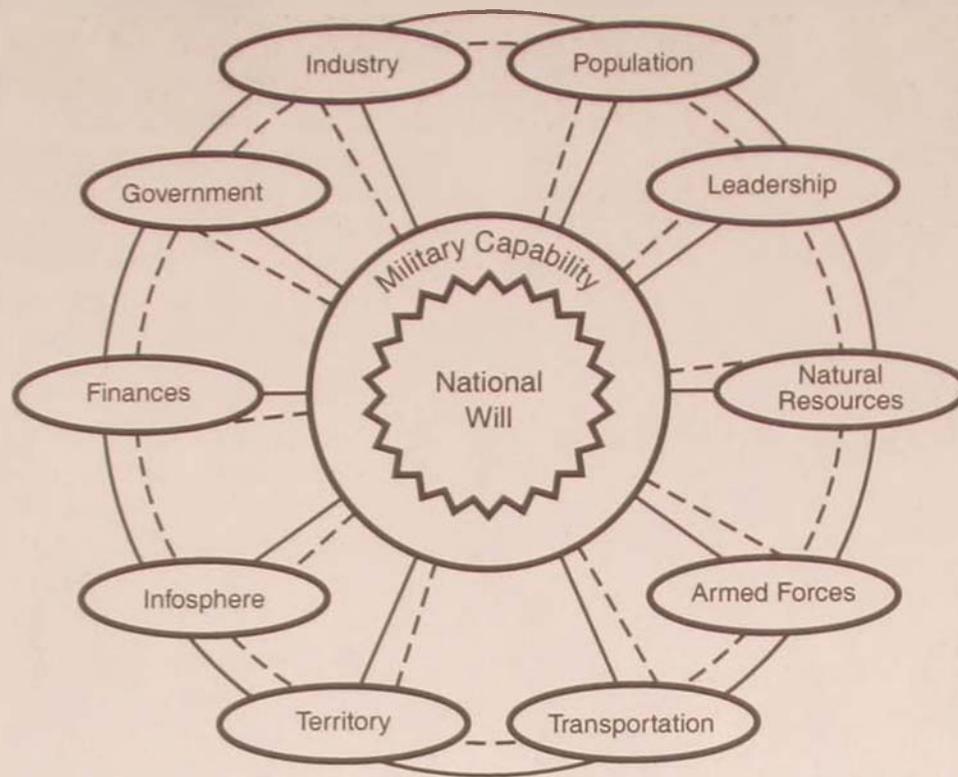


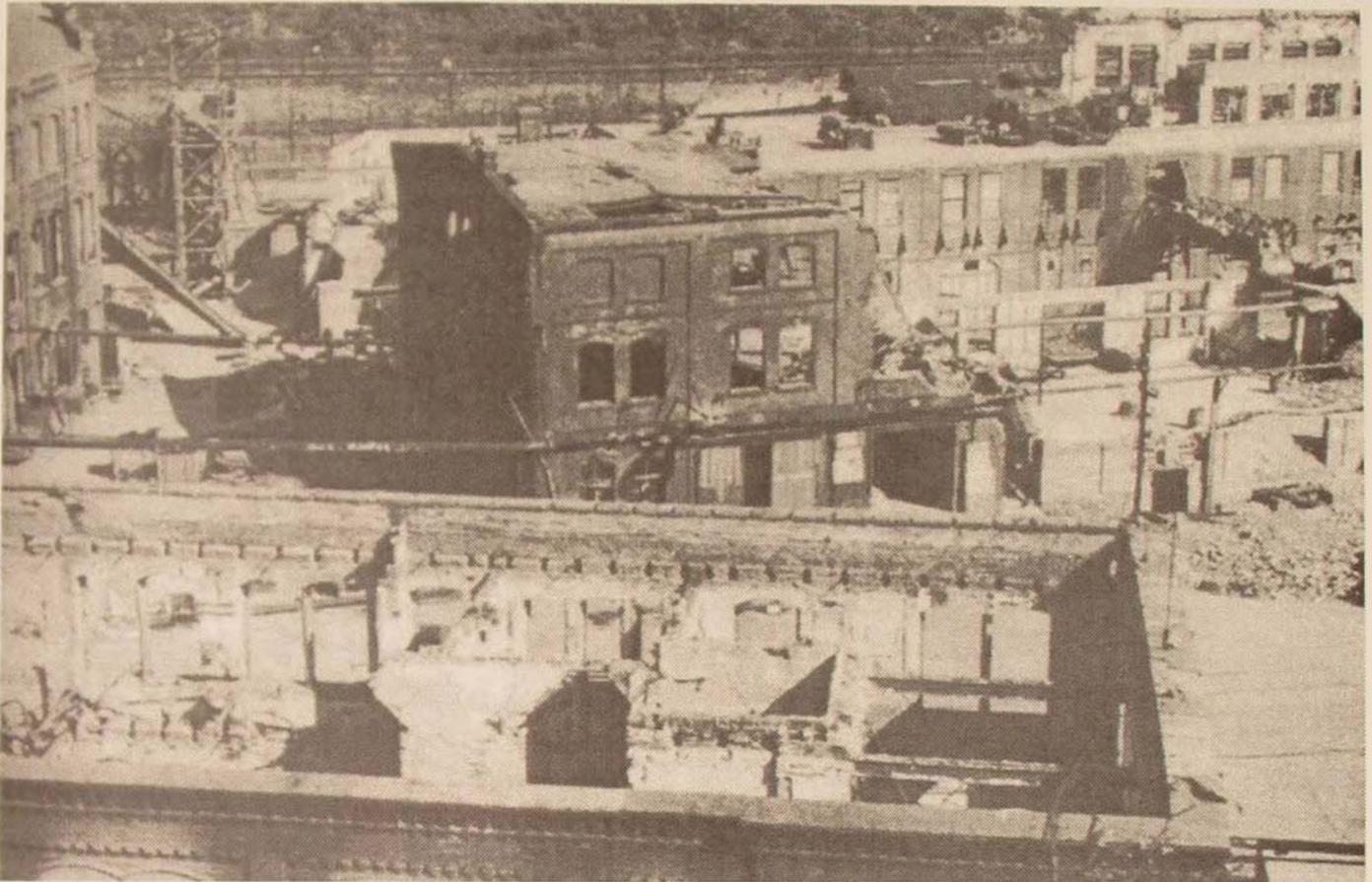
Figure 4. The Notional Nation-State

The nodes surrounding the central core are the de facto COGs that can be targeted. As noted above, in the past the armed forces and the territory of the enemy were generally the foci of operations because they were the most accessible. Often, if the army were defeated or if a strategically located province were overrun, a negotiated settlement would follow. New capabilities offered new opportunities. The history of air strategy is a history of targeting—trying to discover which COG is the most important in a given place, time, and situation. Although air theorists might agree that airpower is intrinsically strategic, they have generally disagreed—vigorously—over which targets are most appropriate to achieve strategic objectives. What follows is a summary of the various strains of airpower targeting theory.

Gen Giulio Douhet believed that the population was the prime target for an air attack and that the average citizen, especially the urban dweller, would panic in the face of air assault.⁹ Limited experience from World War I

seemed to support that contention. Douhet, therefore, was convinced that dropping a mixture of incendiary, chemical, and high-explosive bombs on a country's major cities would cause such disruption and devastation that revolt and subsequent surrender were inevitable. Although his predictions regarding the fragility of a country's vital centers and the weakness of a population's resolve were to prove grossly in error during World War II, his basic premise has had an enduring appeal.

Fortunately, Douhet's American and British counterparts saw in airpower the hope of targeting things rather than people. Air doctrine in the United States and Britain during the interwar years focused on the enemy's industrial infrastructure, not his population. In this view, the modern state was dependent on mass production of military goods—ships, aircraft, trucks, artillery, ammunition, uniforms, and so forth. Moreover, essentials such as electrical power, steel, chemicals, and oil were also military targets and of great importance because they were the essential build-



Damage to a submarine-battery plant, Hagen, Germany. The Combined Bomber Offensive's support for the Battle of the Atlantic exemplified the challenges in priorities and targeting. Early on, submarine pens on the French coast were relatively easy targets, but Allied aircraft could damage these hardened structures only with bombs developed later in the war. The Strategic Bombing Survey found that damage done to the few factories supplying storage batteries and motor generators substantially reduced the supply of these critical components, affecting both submarine maintenance and new construction.

ing blocks for other manufactured military goods needed to sustain a war effort.

In America, the ideas of Brig Gen Billy Mitchell heavily influenced the Air Corps Tactical School, whose faculty refined a doctrine that sought industrial bottlenecks—those factories or functions that were integral to the effective operation of the entire system.⁴ This “industrial web” concept envisioned an enemy country as an integrated and mutually supporting system but one that, like a house of cards, was susceptible to sudden destruction. If one attacked or neutralized the right bottleneck, the entire industrial edifice could come crashing down.⁵ It was this doctrine that the Army Air Forces carried into World War II.

The Royal Air Force (RAF), led by Air Marshal Hugh Trenchard, took a slightly different approach. Trenchard himself had witnessed

the extreme reaction by the population and its political leaders to the German air attacks on Britain in 1917 and 1918—after all, these attacks led to the creation of the RAF. He argued, as did Douhet, that the psychological effects of bombing outweighed the physical effects. Unlike the Italian general, Trenchard did not believe that attacking people directly was the correct strategy to produce psychological trauma.⁶ Such a policy was morally and militarily questionable. Instead, he advocated something similar to the strategy of the Air Corps Tactical School: a country’s industrial infrastructure was the appropriate target. He reasoned that the disruption of normal life—the loss of jobs, wages, services, transportation, and goods—would be so profound that people would demand peace. In short, whereas the Americans wished to bomb in-

dustry to destroy capability, Trenchard and the RAF sought to bomb industry so as to destroy the national will.

The massive and decisive use of airpower in [World War II] should have spawned an outburst of new thinking in the years that followed. Surprisingly and unfortunately, that was not the case.

Yet another RAF officer, Wing Commander John C. Slessor, grappled with the complexities of air theory between the wars.⁷ He argued that the enemy army's lines of supply and communications were the key COG and that if the transportation system of the enemy were disrupted and neutralized, not only would the enemy army be unable to offer effective resistance but also the entire country would be paralyzed and vulnerable. This paralysis, in turn, would have a decisive effect on both the enemy nation's capability and its will. In essence, Slessor advocated strategic- and operational-level air interdiction. Significantly, the RAF pushed strongly for just such an air campaign against Germany in 1944. The "transportation plan," as it was called, indeed proved successful in assuring the success of the Normandy landings by severely restricting the flow of German reinforcements to the lodgment area. In addition, the wholesale destruction of the Germans' rail system in Western Europe had devastating effects on their entire war effort, as Slessor had predicted.

Significantly, most of the individuals and theorists mentioned thus far are from the pre-World War II era. In truth, the massive and decisive use of airpower in that war should have spawned an outburst of new thinking in the years that followed. Surprisingly and unfortunately, that was not the case. The atomic strikes on Japan had both a catalyzing and numbing effect on military leaders worldwide. The new weapon appeared to revolutionize warfare in ways that made all prior experience obsolete. As a consequence,

a different group of theorists arose in an attempt to explain the use of military force in this new age. These theorists, however, were not from the military. Rather, a new breed of civilian academics with little or no experience in war emerged to define and articulate theories of nuclear war. Since no one had any experience with this type of war, civilian academics were seemingly as capable at devising a theory of nuclear air warfare as were uniformed professionals. The ideas they proposed—balance of terror, mutual assured destruction, strategic sufficiency, and the like—were elegant and reasoned. They served the West well throughout the cold war era. Regrettably, however, military airmen all too easily and quickly abandoned the intellectual field to the civilians. At the same time, the military accepted the premise that future wars would involve nuclear weapons. The result was that few airmen gave serious thought to the use of conventional airpower, especially at the strategic level.

The Vietnam War had many negative effects on both the United States and the military services. One positive aspect, however, was the growing realization that nuclear war between the two superpowers was an interesting intellectual exercise but hardly likely to occur—if only because we were so well prepared to wage it. At the same time, tactical airpower seemed not to be a war-winning weapon, as Vietnam amply demonstrated. Thus, while airpower had become polarized between people who thought only of nuclear holocaust and those who prepared to fight the tactical air battle, world conditions seemed to indicate that neither extreme offered useful and decisive results. The vast middle ground between those two poles had to be recaptured. The revitalization of strategic conventional thought began with an instructor at the Fighter Weapons School at Nellis AFB, Nevada—Col John Boyd.

Boyd was intrigued by the astounding success of the F-86 in air combat with the MiG-15 (a 10-to-one superiority) during the Korean War.⁸ Upon reflection, he decided that the F-86's advantage largely resided in its hydraulically operated flight controls and all-flying

horizontal stabilizer that allowed it to transition from one aerial maneuver to another more rapidly than the MiG. Further thought revealed the broader implications of this theory. The key to victory was to act more quickly, both mentally and physically, than one's opponent. Boyd expressed this concept in a cyclical process he called the observe-orient-decide-act (OODA) loop (fig. 5). As soon as one side acted, it observed the consequences, and the loop began anew. The most important portion of the loop was the "orient" phase. Boyd speculated that the increasing complexities of the modern world necessitated an ability to take seemingly isolated facts and ideas from different disciplines and events, deconstruct them to their essential components, and then put them back together in new and unusual ways. He termed this process *destruction and creation*—a process that dominated the orient phase of his OODA loop.

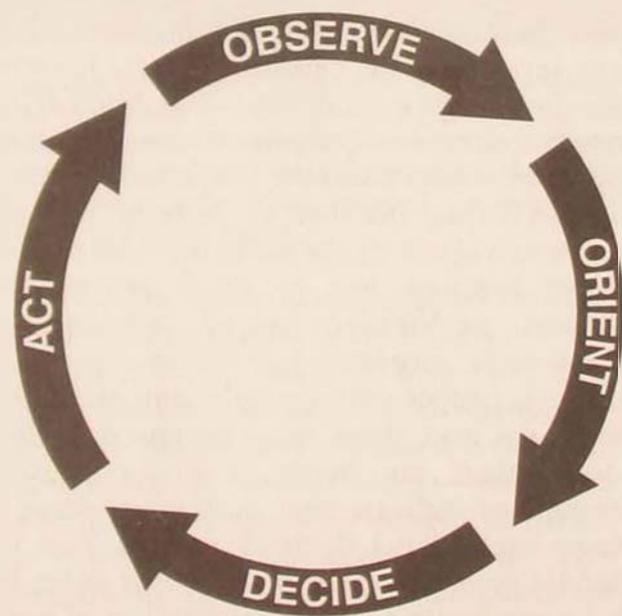


Figure 5. John Boyd's OODA Loop

The significance of Boyd's tactical air theories is that he later hypothesized that this continuously operating cycle was at play not only in an aerial dogfight but also at the higher levels of war. In tracing the history of war, Boyd saw victory consistently going to the side

that could think more creatively—orient itself—and then act quickly on that insight. Although military historians tend to blanch at such a selective use of history, the thesis is interesting. Significantly, because of the emphasis on the orientation phase of the loop, in practical terms Boyd was calling for a strategy directed against the mind of the enemy leadership. Although posited by an airman, these theories encompassed far more than a blueprint for air operations. Warfare in general was governed by this process. Nonetheless, because of the OODA loop's emphasis on speed and the disorienting surprise it inflicts on the enemy, Boyd's theories seem especially applicable to airpower, which embodies these two qualities most fully.

Another airman has thought deeply on strategic airpower and has focused on enemy leadership as the key COG—Col John Warden. Like Boyd, a fighter pilot and combat veteran, Warden began a serious and sustained study of air warfare while he was a student at the National War College in 1986. The thesis he wrote that year was soon published and is still a standard text at Air University.⁹ His subsequent assignment in the Pentagon put him in an ideal location when Saddam Hussein invaded Kuwait in April 1990. Putting his theories into practice, Warden designed an air campaign that called for strategic attacks against Iraq's COGs.¹⁰ To illustrate his plan, he used a target consisting of five concentric rings with leadership at the bull's-eye—the most important as well as the most fragile COG—and armed forces as the outermost ring—the least important but also the most hardened element. Warden posited that the enemy leader was the key to resistance; killing or capturing him would incapacitate the entire country. It is apparent that both Boyd and Warden have turned away from the economic emphasis of previous airpower theorists. Instead, they focus on the enemy's leadership. However, whereas Boyd seeks to disrupt the *process* of the enemy's leadership, Warden wishes instead to disrupt its *form*. The epitome of such an air strategy was the Gulf War. Air strikes against the Iraqi communications network, road and rail sys-

tem, and electrical power grid made it extremely difficult, physically, for Saddam to control his military forces, but it also introduced enormous confusion and uncertainty into his decision-making process. This served to expand his OODA loop dramatically and slow its cycle time accordingly.

Information warfare has become a growth industry. Seemingly, everyone in the world has or soon will have a fax machine, cellular telephone, powerful microcomputer, and access to the Internet. As a result, the accelerating pace of information exchange has become both a strength and a vulnerability for a modern country. Knowledge, presumably, is power. Whoever controls information flow has a tremendous advantage: "perfect information" for oneself and imposed ignorance, through either denial or corruption, for an enemy. To be sure, information—when broadly defined as intelligence, reconnaissance, and communications—is not new. However, the explosion in the volume and dissemination of such information—made possible by technology such as the microchip, fiber optics, and satellites—has given new intensity to an old concept. The ability to dominate information is often referred to as "infowar" and almost presumes a physical entity, sometimes called an infosphere, in which information resides or through which it is channeled. This infosphere is thus a potentially very important COG and one that has interesting implications for how future air warfare might be conducted.

Another "new" wrinkle in military theory stresses the cultural aspects of conflict. Although physical manifestations of power are the most discernible—the easiest to target and quantify—the cultural and social aspects of a society are also crucial. John Keegan, for example, has argued that the Clausewitzian model of war is flawed because it presumes conflict occurs between nation-states that are what we would call "rational actors" (i.e., they make decisions regarding peace and war based on a logical calculus grounded in policy). Keegan maintains that such factors explain only some motives for war; other societies are far more culturally based. He cites

examples of Zulus in Africa, Siberian Cossacks, and Japanese samurai to demonstrate that some groups make war because it is traditional, a rite of passage to manhood, or a

Military strategists must be aware that they are dealing with an enemy who is part rational and part irrational, and who is motivated by reasons of both policy and passion.

safety valve to release excess energy.¹¹ In such cultures, what Westerners would term the traditional causes of war and peace is largely irrelevant. The significance of this argument is not that small groups of isolated natives have in times past gone to war for reasons we would consider quaint. Rather, if these factors are present in some peoples, they are present in all peoples. In more modern societies, however, these cultural factors are subsumed or overshadowed by the more traditional political imperatives; they are not replaced by them. Thus, all people and countries do things or do not do things, based on a collection of reasons—some physical and some cultural or psychological. Military strategists must be aware that they are dealing with an enemy who is part rational and part irrational, and who is motivated by reasons of both policy and passion. When a modern country is dominated by a worldview that is seemingly completely alien from a Clausewitzian perspective, the problem for the air strategist becomes extremely complex.

One could argue, for example, that the passionate faith of Islamic fundamentalism effectively holds modern Iran together—not oil resources or the traditional political bonds of a Western country. Rather than the notion that the Iranian state uses religion as a tool of its policy, it would seem that radical Islam uses the state as a tool to achieve its religious goals. Air strategists have a difficult enough time attempting to predict effects and responses when they deal with a "similar

enemy"; dealing with a dissimilar enemy greatly magnifies the problem. Nonetheless, realizing the importance of such intangible factors as the enemy culture is crucial to military planners. The fact that something may not have a physical form does not mean it is not important—nor does it mean it is imperious to attack. In such instances, psychological-warfare operations—the use of propaganda, ruse, deception, disinformation, perhaps even the truth—can be decisive. In my schematic, these intangible but vital connections are represented by the dotted lines linking the physical COGs to each other and the national core (see fig. 4).

It is useful at this point to introduce some new terms used to describe air strategy. The object of war is to impose one's will on the enemy by destroying his will or capability to resist. An ongoing debate examines whether it is more desirable and feasible to focus on the enemy's will or his capability; consequently, military strategists and thinkers often fall into two categories. The first includes those who focus on seeking methods of confusing, deceiving, frightening, or otherwise influencing the mind of the enemy in the hope of shattering his *will* and thus causing surrender. The other school, more physical and direct, believes that if one attacks the enemy's military forces or industrial infrastructure, thus removing his *capability* to resist, then surrender must follow. Some people, especially those trained in the social sciences, have put new terms on these old concepts and now refer to *coercion* and *denial* strategies. Proponents of these two camps have engaged in vigorous debate over the past decade. In truth, it is virtually impossible to separate these two types of strategies in practice. If the point of attacking, say, an enemy's forces is to deny him the ability to fight, then it is highly likely that such an inability will also have a strong coercive effect on the enemy's will. Conversely, if an attack on the enemy's oil refineries is intended to break his will because it destroys something he values, then at the same time the value of the lost oil revenue will decrease his ability to

fight. The issue, therefore, becomes one of emphasis.

To a great extent, the choice of strategy will be driven by objectives and by the nature of the war. In a total war, with surrender and subjugation of the enemy as the goal, destruction of the enemy's will *and* his capability will likely be necessary. Thus, in World War II the Allies conducted a war against both Germany's will and its capability—coercion and denial. Similarly, in the case of Iraq, both strategies were employed, albeit for different reasons: the coalition wanted to coerce Saddam into leaving Kuwait but also wanted to deny him the capability of remaining an offensive threat in the region thereafter. Other conflicts, such as that in Kosovo, are more problematic regarding the type of strategy employed. The North Atlantic Treaty Organization sought to coerce Serbia into stopping its ethnic cleansing in Kosovo. *Coercion* would ordinarily entail the attack of high-value targets in Serbia itself, but planners also employed a *denial* strategy by targeting Serbian military forces and infrastructure in Kosovo. Slobodan Milosevic surrendered, but was it the coercion or the denial targeting that brought him to that decision? We may never know. One must realize, however, that the choice of strategy will have a significant effect on the targets selected for air attack—power lines versus munitions factories versus rail yards versus artillery pieces. Our policy goals and the nature of the war will determine the most effective air strategy to employ.¹²

The task of the air strategist is to understand these various targeting theories and select one, or a combination of several, to make into a workable plan. One does this by first asking three fundamental questions: What is the goal? How much is it worth to achieve that goal? What is it worth to the enemy to prevent the opponent from achieving it? The air strategist must then devise a plan that involves transforming broad goals into specific military objectives, identifying the target sets that need to be affected (not necessarily destroyed) to attain those objectives, and then converting the whole into an operations order that can be implemented.¹³ One can-



DOD photo (released).

Poststrike photograph used in bomb damage assessment of the Novi Sad Petroleum Refinery, Serbia. The photo was part of a press briefing on NATO's Operation Allied Force held in the Pentagon on 3 May 1999.

not overemphasize the importance of clearly linking the targets chosen and the objectives sought. What specifically does one expect the enemy to do if his power grid is bombed? If the overall objective is to force the enemy to halt an invasion, then how will striking the power grid—or munitions factory or armored divisions or intelligence headquarters—contribute towards achieving that goal? In other words, destroying or neutralizing a target does not mean that one is any closer to attaining one's goals. The intellectual process of linking ends and means is a crucial, yet too often overlooked, requirement for the air strategist.

Perhaps one of the most important factors to remember in this entire discussion of COGs is that society is a living organism

which reacts to a myriad of internal and external stimuli. Indeed, all the COGs in the schematic are connected to each other to illustrate that an attack on one usually will have an impact on all the rest. Hence, striking industry will affect the overall military capability of a country, which will also affect the national will. In turn, the will may crack, or, more likely, the leaders will send a signal to direct more people and resources to rebuild the damaged industries. The organism will react to counter the threat. In short (and this is crucial to note) this schematic depicts a living entity—precisely what a country is—that can act and react to various stimuli. And it can do so in ways that are not necessarily predictable: it can move, shift, alter its appearance, defend itself, panic, and/or steel itself.

Indeed, organisms develop scar tissue after they have been injured, sometimes making subsequent injury less severe. As a result, the second attack, to some extent, hits an organism different from the one first attacked. Correspondingly, the results may also be different. Thus, the tendency to view an enemy country as an inanimate, two-dimensional model is extremely dangerous because it assumes a static, laboratory condition that is far from the case. Imposing rationality on an enemy society via computer simulations and models is foolhardy. War can never be completely rational—no more so than the people who wage it.

One should also understand that the COGs of one country are not necessarily those of another. In the case of Japan during World War II, for example, sea-lanes were vital because so many of its required raw materials came from the Asian mainland or the East Indies. However, sea-lanes were not vital to Nazi Germany. Because Hitler controlled most of Europe, he was largely self-sufficient in raw materials and barely affected by the Allied blockade. Similarly, an autocratic country like Nazi Germany may be more dependent on the personality and power of the leader than is a democracy with a clearly established line of succession in the event of the leader's death.

Moreover, not only are COGs often different between countries, but they may change over time within the same country. During the Battle of Britain, for example, the RAF was perilously short of pilots and aircraft. Had the Luftwaffe continued to attack RAF airfields in the fall of 1940, this key British COG may have cracked. The following year, however, the RAF was no longer in such dire straits because planes and pilots were far more plentiful. By that point, however, the key British COG had moved into the Atlantic. German U-boats were sinking British shipping at an alarming pace, and serious concern existed as to whether or not Britain could long endure. Significantly, this key COG also changed when the United States entered the war, and the massive infusion of shipping capacity alleviated the British plight.

If one agrees that an enemy country is a living organism composed of multiple COGs that act and react with one another and the outside world, then several conclusions follow. First, airpower is an especially effective weapon for affecting those COGs. Most of the vital centers noted above are physical and can be directly targeted. Indeed, because they are for the most part immobile and thus vulnerable—a power grid, railroad network, or factory complex, for example—they are often especially susceptible to the effects of airpower. Other types of military force cannot generally act against such targets directly and are limited to operations against fielded forces.¹⁴ Of course, airpower can attack those forces as well and can do so quite effectively. Reasons for turning to airpower in the post-World War I era when anticipating war against an industrial opponent include the desire to avoid bloodshed, the interdependence of modern economies, the perceived vulnerability of strategic COGs, and airpower's ability to affect them at relatively low risk. It is important to note that the number of such reasons has tended to increase over the decades. To be sure, the intangible aspects of a country—its culture, religion, and tradition—will be difficult to influence, but that is the case when one uses all military forces, not just airpower.

Determining the key target or group of targets within a country requires careful and accurate measurement of the effects of strategic air attacks. This analysis is essential to ensure that the results are what were expected so that one can make adjustments for future operations. This is not a minor consideration. Air intelligence is a relatively new phenomenon. Although information-gathering agencies have existed for centuries, the types of intelligence they sought ran to two extremes. On the one hand, they looked for diplomatic insights to determine potential adversaries' foreign policy, strength of the government, alliance commitments, or soundness of the economy. On the other hand, they also wished to ascertain military information, such as the size of the enemy army and navy, route of march, adequacy of supplies, and rate of fire of the artillery. Although tactical infor-

mation is also necessary for the air battle—the strength, disposition, and capability of the enemy air force and air defense network—strategic air warfare demands a totally new type of intelligence. Detailed economic and industrial information is also now required. Because aircraft can strike military, economic, and governmental centers deep within enemy territory, one must know the precise location and function of such targets. Air warfare requires a detailed understanding of the electrical power grid, rail and road network, iron and steel industry, communications network, and a host of other such items. This type of military intelligence differs fundamentally from that of previous eras. As a result, during World War II new bureaucracies arose, composed of economists, industrialists, and engineers whose main function was to study the makeup and vulnerabilities of an enemy state.¹⁵ Today, these intelligence agencies form a major portion of the military, and their products are vital to the formulation of a viable air campaign plan.

At the same time, air leaders quickly realized in World War II that understanding how an economic or industrial system *failed* was just as important as knowing how it operated. They needed a way to measure the effects of air attacks on a complex, interconnected, and multilayered system—an extremely difficult task because it requires analyses of complicated networks. For example, it is relatively easy to determine the amount of physical damage an air attack causes to a railroad marshaling yard—the number of buildings or railcars destroyed, tracks torn up, and so forth. It is more difficult to measure the effect such damage will have on an entire rail network, given the redundancy of such systems, the availability of repair teams, and the ability to route traffic through other yards. It is more difficult still to judge what effect the shortage of materials *not* moved by the destroyed trains will have on the economy as a whole. One finds an illustration of this problem and its complexity in the work of one historian who has examined the records of the German railroad bureau in World War II. His analysis revealed that the destruction and disruption of

German rail traffic severely curtailed the movement of coal, the primary fuel for most industrial production and power generation, throughout the Reich. Therefore, the shortage of coal caused by the disruption of the rail system had a major effect on the production of steel, resulting in the decreased output of tanks, ships, and heavy artillery.¹⁶ Thus, air strikes against seemingly unrelated targets deep in Germany reduced the overall military capability of the German armed forces. Clearly, such analysis requires intimate familiarity with the enemy's economy as well as keen analytical skills. These are not the only problems.

If John Keegan is correct in his assertion that social and cultural factors play a far greater role in war than has hitherto been acknowledged, then the problem of analysis becomes even greater. This difficulty becomes compounded if one considers that a country may strike a particular target not because of the effect it expects to produce on the enemy but for the effect on its own domestic population. Gen Jimmy Doolittle's raid that sent 16 bombers against targets in Tokyo in April 1942 not only influenced the Japanese leaders or the Japanese economy but also bolstered American morale after a series of defeats. Similarly, one may carry out attacks to influence a third country. Some people would argue, for example, that we dropped the atomic bombs on Hiroshima and Nagasaki not to compel Japanese surrender but to send a political message to the Soviet Union—as an act of deterrence for the future.¹⁷ Similarly, did the air strike on Libya in 1986 in response to the terrorist bombing in Berlin have an equally deterring effect on Syria? In short, we must remember that warfare consists of living organisms fighting other living organisms while still other living organisms look on and are affected. Actions in war, therefore, have effects on both participants and nonparticipants, and those effects may be both intended and unintended. If such complex and layered motives are indeed at play, the problems of analysis are enormous. It thus becomes necessary for intelligence organizations to focus on making a second

leap—from an understanding of industrial and economic processes to cultural and psychological ones. This will not be easy.

Until it becomes possible to accurately and predictably measure and quantify such macrolevel effects, airmen will always be at a disadvantage, compared to their surface counterparts. For centuries one has traditionally measured victory or defeat on land in terms of armies destroyed, soldiers slain, and territory captured. Such standards are both quantifiable and widely recognized. One must remember, however, that just as the absence of hard statistics does not necessarily mean a theory is wrong, so does their presence not necessarily confirm that a theory or policy is correct. Americans seem to have a cultural penchant for measuring things, especially in war—bomb tonnage, sortie rates, body counts, tank kills—and this can beguile one into thinking that the mere presence of numbers implies either accuracy or success. If one is measuring the wrong things, however, the statistics are worse than meaningless.

In summary, it has become apparent over the past six decades that airpower is playing an increasingly important role in warfare. Surface-force commanders realize that their operations are extremely difficult, if not impossible, without the extensive employment of airpower. Indeed, our Navy has built most of its force structure (the carrier battle groups) around airpower; the Marine Corps has organized its air-ground task forces

around airpower; and the Army's five thousand helicopters constitute the largest air arm in the world. Few people question the ability of airpower to be decisive at the tactical and operational levels of war. The issue of its effectiveness at the strategic level of war, however, is a different matter. Airmen have claimed since the first decade of flight that warfare has been forever changed because of their new weapon. Without denying the dominance of airpower on the battlefield, they argue for its preeminence at the strategic level as well. Their arguments for this contention have relied upon their various targeting philosophies. The question as to which strategic targets should have priority in an air campaign is surprisingly complex, and the answer is not at all self-evident. As a result, a variety of air theories has sprung up, each with its own logic and evidence.

The statement "flexibility is the key to airpower" has become an aphorism. That is just as true in the theoretical sense as in the operational. We now need airmen conversant and well grounded in all aspects of warfare, including the theoretical. Only then will they be able to select the employment concept best suited to the situation at hand. Flexibility is also the key to air strategy. Ultimately, air-targeting strategy is an art, not a science. Unfortunately, it is an incredibly complex art. This article has sought to better arm air strategists with an appropriate array of questions so that they can make better decisions in peace and war. □

Notes

1. Hence, Clausewitz's dictum that "destruction of the enemy forces is the overriding principle of war, and, so far as a positive object is concerned, the principal way to achieve our objective." Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 258.

2. An exception was Nazi Germany. Not until the German air force, army, and navy were largely destroyed; the economy was in shambles; and Soviet troops had actually entered Berlin did Hitler's successor sue for peace. Given the state of the Reich at that point, his official surrender was almost irrelevant.

3. Douhet's primary work was titled "Command of the Air," first published in 1921, with a revised edition appearing in 1927. In 1942 this essay was combined with three other of his major works, translated by Dino Ferrari, and published as *Command of the Air* (New York: Coward-McCann). In 1983 the Air Force History Office reprinted his translation with a new introduction. For

analyses of Douhet's theories, see Bernard Brodie, *Strategy in the Missile Age* (Princeton: Princeton University Press, 1959); and Col Phillip S. Meilinger, "Giulio Douhet and the Origins of Airpower Theory," in *The Paths of Heaven: The Evolution of Airpower Theory* (Maxwell AFB, Ala.: Air University Press, 1997), 1–40.

4. See Lt Col Peter R. Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," in *Paths of Heaven*, 183–238.

5. The origins of the industrial-web theory can be found as early as the mid-1920s. Maj William C. Sherman, an instructor at the Air Corps Tactical School, wrote, "In the majority of industries, it is necessary to destroy certain elements of the industry only, in order to cripple the whole. These elements may be called key plants." *Air Warfare* (New York: Ronald Press Co., 1926), 218. For the developments of the 1930s, see the account by one of the

participants, Maj Gen Don Wilson, "Origins of a Theory of Air Strategy," *Aerospace Historian* 18 (Spring 1971): 19-25.

6. For an analysis of Trenchard's theories, see Col Phillip S. Meilinger, "Trenchard, Slessor, and Royal Air Force Doctrine before World War II," in *Paths of Heaven*, 41-78.

7. Slessor's ideas have not yet been adequately explored. For his excellent memoirs, see *The Central Blue: Recollections and Reflections* (London: Cassell, 1956). His most impressive theoretical work is *Air Power and Armies* (London: Oxford University Press, 1936).

8. John Boyd never published his theories, but the best description and evaluation of them is by Lt Col David S. Fadok, "John Boyd and John Warden: Airpower's Quest for Strategic Paralysis," in *Paths of Heaven*, 357-98.

9. Col John A. Warden III's *The Air Campaign: Planning for Combat* (Washington: Pergamon-Brassey's, 1989) has had a major impact on Air Force thinking, even though its calls for strategic airpower are relatively modest. Indeed, it is illuminating that Warden's book today elicits little controversy; the ideas he proposed then have become accepted wisdom. Warden's ideas took a sizable leap with the experience of the Gulf War.

10. For a readable and illuminating account of air campaign planning in Desert Storm, see Col Richard T. Reynolds, *Heart of the Storm: The Genesis of the Air Campaign against Iraq* (Maxwell AFB, Ala.: Air University Press, 1995).

11. See John Keegan, *A History of Warfare* (New York: Knopf, 1993). For an excellent analysis of how cultural factors apply to air warfare, see Lt Col Pat Pentland, "Center of Gravity Analysis and Chaos Theory: Or How Societies Form, Function and Fail" (Maxwell AFB, Ala.: Air War College, 1993); and Paul M. Belbutowski, "Strategic Implications of Cultures in Conflict," *Parameters* 26 (Spring 1996): 32-42.

12. For good discussions, see Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, N.Y.: Cornell University Press, 1996); and Michael Clarke, "Air Power, Force and Coercion," in *The Dynamics of Air Power*, ed. Andrew Lambert and Arthur C. Williamson (Bracknell: Royal Air Force Staff College, 1996).

13. For excellent discussions of this process, see Lt Col Maris McCrabb, "Air Campaign Planning," *Airpower Journal* 7, no. 2 (Summer 1993): 11-22; and David E. Thaler and David A. Shlapak, *Perspectives on Theater Air Campaign Planning* (Santa Monica, Calif.: RAND, 1995).

14. Actually, airmen do believe in the decisiveness of the counterforce battle—the one for air superiority. Without air superiority—gained by destroying or neutralizing the enemy's air force and ground defenses—all other military operations on land, at sea, and in the air will be extremely difficult.

15. A study of these economic warriors has yet to be written, but for the views of two participants, see (for the Americans) W. W. Rostow, *Pre-Invasion Bombing Strategy: General Eisenhower's Decision of March 25, 1944* (Austin: University of Texas Press, 1981); and (for the British) Baron Solly Zuckerman, *From Apes to Warlords: The Autobiography (1904-1946) of Solly Zuckerman* (London: Hamilton, 1978).

16. See Alfred C. Mierzejewski, *The Collapse of the German War Economy, 1944-1945: Allied Air Power and the German National Railway* (Chapel Hill: University of North Carolina Press, 1988).

17. For an excellent discussion of these ideas, see Maj Thomas P. Ehrhard, "Explaining the SAAS Airpower Analysis Framework" (master's thesis, School of Advanced Airpower Studies, Maxwell AFB, Ala., 1995).

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Left to right: Almerisio B. Lopes, editor, Portuguese edition, *Aerospace Power Journal*, and Alfredo F. González, editor, Spanish-American edition, *Aerospace Power Journal*.



DEPARTMENT OF THE AIR FORCE
OFFICE OF THE CHIEF OF STAFF
UNITED STATES AIR FORCE
WASHINGTON DC 20330

4 August 1999

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To the Editors and readers of the *Airpower Journal*

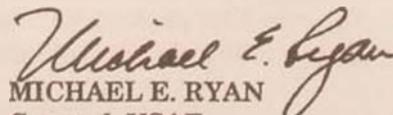
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Again, congratulations, Latin American editions of *Airpower Journal*!


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General, USAF
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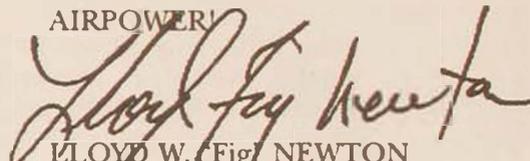
Dear *Aerospace Power Journal* Team

On behalf of the men and women of Air Education and Training Command, I heartily congratulate you on the 50th anniversary of your premier journal. The Spanish and Portuguese editions of *Airpower Journal* have done much to promote strong cooperation and mutual understanding among the air forces of the Americas.

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LLOYD W. Fig NEWTON
General, USAF
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The bonds of friendship, comradeship, and mutual respect between the USAF and the Brazilian Air Force (FAB) were forged during World War II, when our squadrons fought as allies during the European Campaign. . . .

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It is read by students in our schools, from Academy cadets to officers in our Air Command and Staff College and Air War College. It is also read at our military organizations and flying units, and can be found in libraries of our civilian universities. Among the *Journal's* qualities I would like to point out are its meticulous editing and grammatical impeccability.

For all the above, please accept my heartfelt congratulations, which I also extend to the College of Aerospace Doctrine Research and Education commander and Air University commander.

—Gen Walter Werner Bräuer
Commander,
Brazilian Air Force

It was with great pleasure that we learned of your/our magazine, *Airpower Journal*. It has generated tremendous interest among our officers because it deals with issues related to air superiority, the primary mission of any air force.

We would also like to thank the US defense attaché in Angola for his kindness and courtesy. It was through him that we began receiving this important vehicle for communications, which deals with current, interesting, and historical topics that are, above all, essential to air development.

We sincerely wish and hope that you maintain your editorial focus and as of now express our desire to contribute in the near future.

—Lt Gen Ary da Costa
Chief of Cabinet
Office of the Chief of Staff
Angolan Air Force

It [*Airpower Journal*] is a reference source because its articles have portrayed facts of military history, thus allowing military professionals who are knowledgeable in the use of airpower to voice their agreements and disagreements about employment doctrines. Its ability to bring the facts to light from a critical perspective is the most beneficial way to learn lessons or even multiply them. By publishing articles of Brazilian military thinkers, *Airpower Journal* has established itself as an important vehicle for the exchange of ideas and has created a partnership between [the US Air Force's] Air University and the Brazilian Air University, thus becoming the reference publication of choice in the country's professional military education environment.

As the Portuguese edition turns 50, almost as old as the Brazilian Air Force itself, UNIFA recognizes the contribution that *Airpower Journal* has made to the discussion of airpower-related issues and highlights its important role as a catalyst that brings air forces of friendly nations together.

—Maj Gen José Américo dos Santos
Brazilian Air Force
Commander, Brazilian Air University

As you celebrate the 50th anniversary of the *Airpower Journal*, Spanish edition, it is my intention to send all at your editorial office cordial greetings to congratulate you for the dedication and professionalism which make the pages so informative, reflecting a significant place to exchange ideas that we airmen have learned to value.

Perusing the published pages in your first 50 years makes us realize a firm calling oriented to dialogue and service to the inter-American air brotherhood.

—Brig Gen Ruben Mario Montenegro
Chief of Staff
Argentinean Air Force

Through its history, *Airpower Journal* can be proud of its achievements. During 50 years, *Airpower Journal*, Spanish edition, has served as a forum to stimulate the free exchange of innovative ideas on military doctrine and strategy and many subjects of national defense. This in turn has served to solidify the friendship ties, the sense of cooperation, and the peace we enjoy throughout the Western Hemisphere.

It is with great pleasure that I have the opportunity on behalf of the Canadian Air Force to extend thanks and congratulations to all who have contributed to the success of your publication.

—Lt Gen D. N. Kinsman
Chief of Staff
Canadian Air Force

The great diversity of subject matter covered and the high academic level of the articles presented in your pages truly make it a valuable point of reference for present thinking in regard to strategy, tactics, organization, and many other themes involved in the operation and development of the modern air force.

Add to that the contributions from authors in many countries in the Western Hemisphere and it shows the spirit which enlivens the airmen of the Americas to forge strong ties of understanding that grow firm and lasting.

—Air General Patricio Rios Ponce
Commander in Chief
Chilean Air Force

Receive our heartiest congratulations on reaching the 50th anniversary of the *Airpower Journal*, Spanish edition, which has served with objectivity, effectiveness, and efficiency all the Spanish-speaking air brotherhood. This is the proper occasion to send from all our personnel—officers and enlisted—a warm greeting.

—Col Edwin Vinicio Campollo Gonzalez
Commander
Guatemalan Air Force

Similar expressions came from the chiefs of the air forces of the Spanish-speaking countries of the Americas, including Bolivia, Colombia, Dominican Republic, Ecuador, El Salvador, Honduras, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. They all wrote of the importance of open dialogue among the men and women of the inter-American air brotherhood and of the significance of *Aerospace Power Journal's* LATAM editions in their members' professional development. The English *APJ* staff would like to add their congratulations on a job well done and wish the LATAM editors continued success in the years ahead.

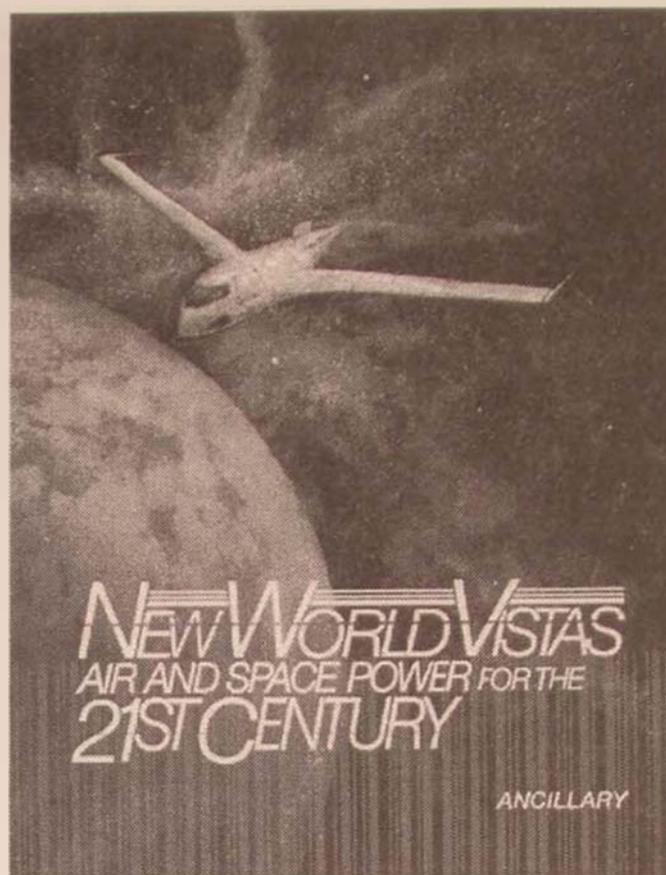
NEW WORLD VISTAS

Looking toward
the Future,
Learning from the Past

LT COL DIK DASO, USAF

OVER FIVE DECADES ago, the Army Air Forces initiated the first technology forecast in military history. The report, *Toward New Horizons*, was written by a team of 31 scientists—all experts in their fields—led by Dr. Theodore von Kármán, the eccentric California Institute of Technology (CalTech) aerodynamicist. Since this first science and technology (S&T) study, the US Air Force has sponsored a major S&T study once each decade. It has been five years since the commencement of the most recent study, *New World Vistas: Air and Space Power for the 21st Century*. Looking back at the yearlong study reveals much about the evolution of the Air Force over the past 60 years.

At the National Academy of Sciences (NAS) building in Washington, D.C., on 10 November 1994, Secretary of the Air Force Sheila Widnall approached the podium before an audience of scientists, Air Force personnel, and at least two historians to deliver her opening remarks for the 50th anniversary gathering of the Air Force Scientific Advisory Board (SAB). She spoke of the émigré Hungarian aeronautical scientist, Kármán, and a career Army Air Forces officer, General of the Air Force Henry "Hap" Arnold, who came together under the pressures of World War II and formed the Scientific Advisory Group



(SAG), the forerunner of the SAB, in the fall of 1944. The SAG's purpose was to forge a detailed plan, a blueprint for the future development of the Army Air Forces. The group was to travel the world, investigate all possible roads of inquiry, and determine how best to pursue new technologies and build a superior air force. Through the spring and summer of 1945, this group of scientists traveled to Germany, England, Japan, the Soviet Union, and many countries in between searching for the finest minds and most advanced laboratories that had, on occasion, nearly tipped the scales of victory in favor of the Axis. The preliminary report, *Where We Stand*, and the final report, *Toward New Horizons*, became the blueprints for the building of the scientific and technological infrastructure of today's Air Force.

The secretary's references to Arnold and Kármán were nothing new. In fact, every time any major Air Force S&T study had been initiated over the past five decades, eloquent speakers had evoked the words and deeds of the two architects of American air su-



Arnold awards Kármán the Meritorious Civilian Service Award for his work on *Toward New Horizons*, February 1946.

premac^y.¹ This occasion turned out to be no different from times past. As she spoke, Dr. Widnall's voice—determined, comfortable, clear, and focused—challenged Dr. Gene McCall and his 1994 Scientific Advisory Board to “rekindle that inquisitive attitude” initiated by Kármán's group some 50 years earlier. McCall was challenged to write a report in the Kármán tradition. The report, *New World Vistas: Air and Space Power for the 21st Century*, was completed on 15 December 1995, exactly 50 years after Kármán's report was placed on General Arnold's desk.

New World Vistas, formally delivered during a senior staff briefing in the secretary's conference room in the Pentagon, was more like Kármán's first report than any of the others

that had been written each decade following *Toward New Horizons*. This was not an accidental occurrence. There were similarities that reflected a cognizance of history, and there were differences that reflected the evolution of science, technology, and society in this country over the past five decades.

This article relates some of my observations as the historian attached to the Air Force Scientific Advisory Board. Then I will make a few comparisons between the first Kármán study and the latest McCall study.

My association with the SAB began as an outcropping of dissertation research. In 1993, at the suggestion of Duane Reed, of the US Air Force Academy Special Collections Branch, I embarked upon a biographical study of General Arnold and Dr. Kármán. In

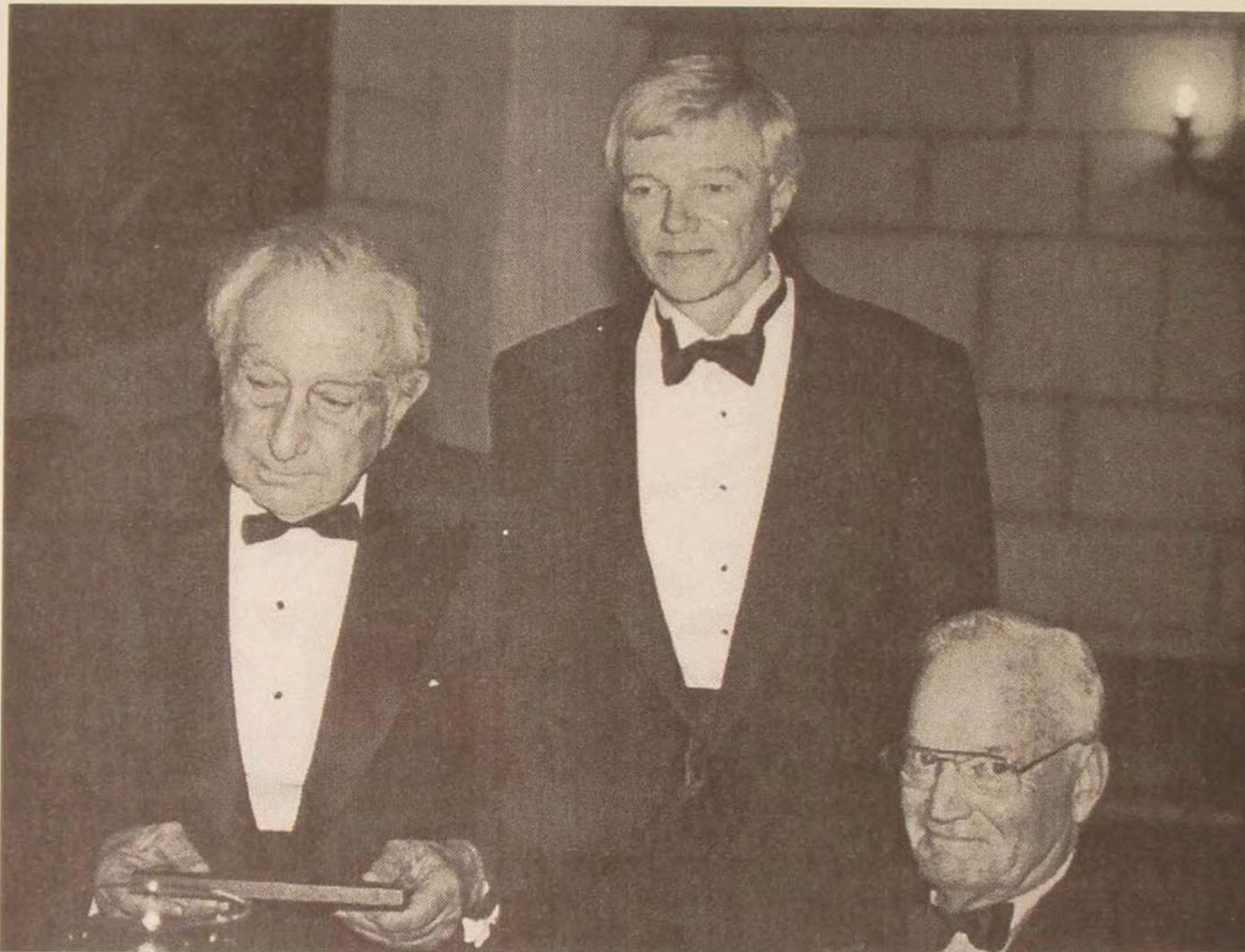
the summer of 1994, I contacted Col Timothy Courington, executive director of the SAB, to arrange to attend the 50th anniversary gathering of the SAB that November. It is my opinion now, as it was after that initial November meeting, that Colonel Courington was the driving force behind the SAB's routine smoothness and today deserves much of the credit for the successful accomplishment of the 1995 McCall report. His reflective, casual, assured approach to most issues impressed every member of the SAB. If there is a silent hero in this story, it is undoubtedly Tim Courington, now retired from the US Air Force.

While in Washington that November, I had the opportunity to interview several of the SAB members, both past and present. It was a researcher's dream come true. In the same room sat two original SAG members, several

past SAB chairmen, many retired USAF officers who had dealt directly with the SAB at all levels, the most outstanding being Gen Bernard Schriever and Gen Lew Allen Jr. General Arnold had participated in Schriever's wedding, and Kármán worked for him when he directed the development of the USAF intercontinental ballistic missile (ICBM) program. Allen was a former Air Force chief of staff and after retirement had directed the Jet Propulsion Laboratory (JPL), the same organization founded by Kármán in the Arroyo Seco of California in the late 1930s. Other notables were Dr. Ivan Gettling, the father of the global positioning system (GPS); Dr. Court Perkins, a masterful storyteller and former chief scientist of the Air Force; Mr. Chet Hasert, a Kármán student, European companion, and original SAG member; and Dr. Ed-



Col Tim Courington, at right, welcomes Dr. Richard Hallion, Air Force historian, and Gen Ronald Fogleman, Air Force chief of staff, to the 50th anniversary celebration of the Scientific Advisory Board, November 1994.



Dr. Edward Teller, Dr. Gene McCall, and Dr. Court Perkins during the awards ceremony at the 50th anniversary gathering



The Arnold "apparition" in the balcony at the NAS that evening

ward Teller, coinventor of the "dry" hydrogen bomb that made the ICBM a practical weapon. General Arnold himself even appeared as an "apparition" from the balcony at the banquet in the NAS that night as part of the entertainment program.

The keynote speaker for the symposium was Secretary of Defense William Perry. Although Vice President Al Gore was supposed to kick off the afternoon session, last-minute priorities canceled his appearance. In any event, interest in the Scientific Advisory Board was and remains keen within the federal government.²

During early November, Dr. Widnall and the Air Force chief of staff Gen Ronald Fogleman (trained in history at Duke University)

formally issued their "New World Vistas" challenge to the SAB in a two-page memo dated 29 November 1994. This sequence was reminiscent of a legendary Arnold/Kármán meeting at LaGuardia Airport back in August 1944. It was at that meeting that Arnold convinced Kármán to write the first S&T forecast for the Army Air Forces. Kármán accepted the challenge, but it was not until 7 November that Arnold got around to putting his request down on paper. My point in recounting these events is to demonstrate that the origins of *New World Vistas* were steeped in the realization and recognition of historical events and Air Force traditions—traditions that began before the Air Force became an independent service. The study itself was to be guided by principles similar to those that Kármán used in the first report. The 16 speeches



Gen Ronald R. Fogleman addressed the SAB members, past and present, at the gathering at the NAS on 10 November 1994.

given at the 50th anniversary symposium throughout that November day traced the chronology of the SAB and were not only informative but at times nostalgic.³ Further, the NAS setting, near a supersized statue of Albert Einstein, helped set an atmosphere of inspiration and imagination for several of the SAB members.

During the first week of February 1995, Dr. McCall finalized plans for the study's format with Dr. Widnall. She insisted that the report should pursue joint service involvement, simulation, and modeling opportunities and should investigate areas where "explosive rates" of technological change might affect the Air Force. Widnall's and Fogleman's November tasking letter quoted Kármán's directly: "Only a constant inquisitive attitude toward science and a ceaseless and swift adaptation to new developments can maintain the security of this nation."⁴

Answering the call to proceed immediately, Dr. McCall selected Maj Gen John Corder, USAF, Retired, not a scientist himself, as his deputy.⁵ A stark contrast existed between these two men. Corder represented the task-minded side of the *New World Vistas* lead-



Secretary of the Air Force Sheila E. Widnall enjoyed the formal gathering at the NAS on the evening of 9 November 1994.

ership. McCall represented the typical scientist: thoughtful, not overly mindful of time schedules, relaxed in the extreme. This pairing was similar to the original SAG's top two. Kármán had selected Dr. Hugh Dryden, longtime chairman of the National Bureau of Standards, an excellent administrator. Kármán, often introspective and self-described as "always late," was counterbalanced by the well-organized Dryden.⁶ The McCall/Corder team held similar balance.

Over the next four months, McCall and Corder selected panel chairmen and held preliminary meetings. By mid-March, the panels were formed (although some changes occurred during the course of the study), and some even met in full session to jump-start the investigation process.

On 10 April, the panel chairmen gathered near Dulles Airport at Westfield's, a luxury meeting facility. The committee chairs gave a brief summary of their preliminary efforts, and a few outsiders delivered specific briefings designed to broaden ideas on S&T forecasting. Of note were presentations by Dr. Peter Bishop, who discussed "alternative futures." This was a true "out of the box" attempt at looking toward the future. Dr. Clark Murdock, deputy special assistant to the Air Force chief of staff on long-range planning, also made a presentation, more conventional but still an attempt to open the panel chairmen's minds to possibilities for envisioning the future. Earlier in the year, John Anderson, a National Aeronautics and Space Administration (NASA) long-range planner, had briefed panel chairmen on his "Horizon Mission Methodology," a "future-to-present" approach to forecasting. The attendees left with an introduction to forecasting that appeared new and far reaching. From my observations, the majority of the panels did not use these methods in their entirety but incorporated portions of them at certain points during the study.

Next, from 2 to 5 May, the SAB general membership meeting took place at Maxwell AFB, Alabama. This meeting, although not specifically designed as a *New World Vistas* panel workshop, turned out to be one of the

most significant events in the yearlong process. Specialists from across the United States, as well as the SAB membership, were invited to participate in working groups that addressed "broad technical and mission areas."⁷ It was during this meeting that the 12 *New World Vistas* panels utilized their time and roughed in preliminary approaches to their specific reports. The rough draft was to be completed by the end of the SAB summer study held in Newport Beach, California, in July—a short three months away. Thus, it was with the help of many nonpanel members—outside of the *New World Vistas* formal structure—that preliminary ideas for the report were developed and shared.

From 10 to 21 July, the *New World Vistas* panels convened in the lovely surroundings of Newport Beach. *Vistas* consisted of six technology panels and six applications panels. The meeting place was the NAS's Beckman Center in Newport Beach, which had been equipped with a network mainframe linking all of the separate panel computers together. Each room was equipped with laptop computers, and each computer was linked to the other. The idea was to simplify and speed up the final editing process. Compared to the SAG working environment of 50 years earlier, this high-technology atmosphere certainly reflected changes in American society as well as within the scientific community. Kármán's group worked with slide rules and manual typewriters. There was only one electric typewriter in the Beckman Center, and the only slide rule might have been found in a display case of old scientific paraphernalia.

The *New World Vistas* study had seven primary objectives:

1. Predict how the explosive rate of technological change will impact the Air Force over the next 10 to 20 years.
2. Predict the impact of these technological changes on affordability.
3. Predict science and technology areas where dual-use defense conversion occurs, industry leads and military follows, and a partnership with industry exists.

4. Predict S&T areas the Air Force will have to develop where no commercial market exists.
5. Offer advice as to whether our lab structure is consistent with the study and what changes, if any, should be made.
6. Offer advice as to whether the current SAB charter is consistent with the findings of the study and what changes, if any, should be made.
7. Evaluate the study in light of how the Air Force contributes to the joint team.

During the length of the study, a World Wide Web page allowed interface directly with the American public. This is, perhaps, the most remarkable aspect of *New World Vistas*. The vast majority of the report is unclassified. One classified volume that incorporates all of the classified portions of all of the panel's reports does exist. Kármán's original study was classified at such a high level that fewer than a hundred copies were distributed, and it remained classified for nearly a decade. Dr. Ivan Getting, also a member of the first SAG study, recalled that the classification of the original report made it nearly useless outside of Air Force circles.⁸

Inexorable links to the civilian, commercial world precluded any serious thought about a restrictive classification. But the nature of S&T has changed dramatically since 1945. Today, the Air Force is becoming a customer of industrial technology, whereas in the past the Air Force (indeed, the military in general) pushed the technological process.

By the end of July, a firm timetable had been established for finalizing the *New World Vistas* report. Corder hoped that the report might be finished by the first week in November. Remarkably, all but Dr. McCall's *Summary Volume* were in final draft form by Thanksgiving. The 15 December report deadline was rapidly approaching, and those handling the final printing process were working long, hard hours to have the report in its final form for the secretary of the Air Force's meeting deadline. Completion was just not possible. The *Summary Volume* had seen several edits during the first week of December amidst stiff



Ivan Getting, father of the global positioning system

discussion by panel members over its content. After some last-minute alterations, the *Summary Volume* was published in enough quantity to ensure that the secretary of the Air Force and all visiting senior staff members received one. In all fairness, the first draft of the *Summary Volume* had been released to the panel chairs in August for their comments. It was the difficulty of incorporating the comments from 12 different sources that slowed the *Summary Volume's* completion. But the majority of reports had not been published in final form. In fact, the volumes piled upon the briefing table on 15 December were simply the draft copies of the panel reports, nicely bound by Air Force graphics.

Kármán's report, although placed on Arnold's desk on 15 December 1945, was only the final draft of the executive summary "Science: The Key to Air Supremacy." The copy of all 33 sections, in 12 volumes, was not finalized until early spring the following year.

Nonetheless, the process of publicly releasing McCall's report began with much fanfare on 31 January 1996. Secretary Widnall and Dr. McCall held a national press conference in the Pentagon to explain the purpose of *New World Vistas*. Dr. Widnall assured reporters that "this report will not sit on the shelf and gather dust."⁹ Prime-time reports



Left to right, Dr. Edward A. Feigenbaum, Gen Ronald R. Fogleman, Deputy Secretary of Defense Paul Kaminski, Secretary of the Air Force Sheila Widnall, and Dr. Gene McCall, November 1994

aired that evening on "ABC World News Tonight with Peter Jennings" and Cable News Network (CNN). Newspapers across the country also carried stories covering the *New World Vistas* report via United Press International (UPI) and Reuters News Agency press releases. The results of the report are also part and parcel of *Air Force 2025*, an Air University project that emphasized planning for the future of the Air Force. The multi-axis approach to forecasting in the Air Force—several studies and agencies working long-range planning issues concurrently—was also an Arnold creation. In 1945, Arnold funded the first RAND studies, established the Office of Scientific Liaison headed by Col Bernard Schriever, and established a separate Research and Development Directorate headed by Gen Curtis E. LeMay.

As with any forecast, some portions will prove right and some wrong. Kármán's 1945 report, for example, did not envision the impact of the computer on the Air Force. But then it seemed that few saw a great need for computers in the age of the slide rule. There is a certain irony in the fact that the chief sci-

entist of the Air Force during the *New World Vistas* study, Dr. Edward A. Feigenbaum, was a computer scientist. Feigenbaum was the first Air Force chief scientist from that discipline and also *New World Vistas* chair of the Information Technology Panel.

In regard to the first SAG study in 1945, there were significant long-term impacts on the fledgling Air Force. Eventual "fallout" included (1) establishment of a permanent Scientific Advisory Group in 1946 strengthened by its reorganization in 1948; (2) establishment of the Air Research and Development Command (ARDC) in 1950; (3) establishment of the Arnold Engineering and Development Center (AEDC) in 1951; (4) creation of the US Air Force Academy in 1956; and (5) establishment of a number of specific development programs, particularly the Air Force ICBM program.¹⁰ These were all fruits of Kármán's intellectual seed. In fact, the institutionalization of science and technology permeating today's Air Force can trace its origins to Kármán's two major reports for General Arnold in August and December 1945.

The conclusions drawn in *New World Vistas* may one day have similar reach as those of Kármán's first study. Perhaps in a decade we will have an idea of their impact. Following is a summary of these conclusions:

1. There will be a mix of inhabited and uninhabited aircraft. Specifically, the Uninhabited Combat Aerial Vehicle (UCAV) will fill many roles and expand performance into the hypersonic range, enabling strikes anywhere on the globe within minutes.
2. Large and small aircraft will project weapons. "Large" aircraft will be the first to carry directed-energy weapons and, eventually, will carry smaller UCAVs internally, providing intercontinental standoff capability. The roles of this type of vehicle will reach into space as well.
3. We must extend airlift capabilities. Expansion of airlift fleets will need to include "point-of-use" delivery capability. Essentially, this means improving precision airdrop capability to keep up with the increased tempo of operations in any future endeavor. "The problem of airdrop should be treated as seriously as the problem of bomb drop."
4. The future force will become efficient and effective through the use of information systems to enhance US operations and confound the enemy. Information and space will become inextricably entwined. The human-machine interface must also improve as the machines improve. "Information munitions" will become part of the inventory just as laser-guided bombs, infrared missiles, or cruise missiles are today.
5. Space and space systems will become synonymous with effective operations. The protection of our assets and the denial of capabilities to an enemy will be essential.
6. Sensors and information sources will be widely distributed. In the past, there has been a failure to recognize that information originates as data from active

and passive sensors. New information systems will correlate data into information much more effectively than before.

Dr. McCall also added a few cautions to those who read only the *Summary Volume*. First, affordability must not be eliminated from the overall picture. Second, and extremely important, operational components of the Air Force must plan jointly—that is, with "each other, other services, and allies." The expanding information network should make this easier in time as "internetting of nodes" becomes more and more seamless.

It is also interesting to note a few of the general guidelines that are attached to the end of the second chapter. Two in particular struck me as significant to the ultimate success or failure of this venture. It is important that all Air Force members be aware of these as potential stumbling blocks to the ultimate implementation of recommendations from this report.

1. Identification and development of revolutionary concepts require intuition, innovation, and acceptance of substantial risk.
2. Most revolutionary ideas will be opposed by a majority of decision makers.¹¹

Clearly, Dr. McCall was suggesting that without bold, creative, high-level leadership, the ultimate success of *New World Vistas* might be at risk. The implication was that in a massive bureaucratic organization like the Air Force, technological change is dependent upon a certain amount of "out-of-the-box" thinking and acceptance of some failures along the way. Whether Air Force leadership, in light of the constant battle of the budget, can make such a leap remains to be seen.

This brings us back to the historical aspects of this report and a statement made by General Arnold back in 1946:

Successful research, being the product of inspiration, cannot be purchased like a commodity. It is the product of the human mind—of intellectual leadership. . . . All of the funds and facilities devoted to research will be wasted unless at the same time America possesses competent

intellectual leadership. . . . The proper cultivation of the human mind is the essence of the task.¹²

The continued evolution of the Air Force as a technological megasystem within the boundaries of a complex American society has been determined by the realities inherent in Arnold's statement during these past five decades, and it will depend on innovative, command-level leadership for the next five decades.

Arnold's words might remind us that, although some elements of military technology may change, other elements remain painfully the same. Perhaps it was Kármán who was most prescient when he said, "A report does not make a policy. It depends on the administration."¹³ McCall has taken that thought one step further. It is McCall's opinion that to be effective and successful, this report must be kept alive through several generations of senior Air Force leadership.¹⁴ Only time will

reveal whether or not McCall's perceptions and desires for his report will compare favorably with Kármán's prescience. Perhaps McCall's own words are best repeated here: "Forecasting is not an exact science, and the path will wind as it disappears into the shadow of the future. We guarantee the journey to be productive even if the road ends in an unexpected place."¹⁵

Since the release of *New World Vistas* in January 1996, the volumes have found their way into Pentagon offices that drive programs—from doctrine to procurement—and into Air Force laboratories where *New World Vistas* projects lace the working docket—from lasers to special materials programs. To judge the *New World Vistas* forecast a success or failure after over five years would certainly be premature; however, construction is under way for the future, even if the road's end is not yet in sight. □

Notes

1. For a summary of the first five studies, see Dr. Michael Gorn's *Harnessing the Genie: Science and Technology Forecasting for the Air Force, 1944–1986* (Washington, D.C.: Office of Air Force History, 1989). This article is a summary of the author's observations made during 1995. He was assigned to the SAB staff as a historical advisor for a videotape produced by Air Force Television that documented the history of the SAB and examined the relationship of Air Force S&T and its impact upon and relationship to the civilian world. To review Kármán's 1945 reports to General Arnold in their entirety, see the appendices in Dik Daso, *Architects of American Air Supremacy: Gen Hap Arnold and Dr. Theodore von Kármán* (Maxwell AFB, Ala.: Air University Press, 1997).

2. Col Timothy Courington to Dr. John McLucas, memorandum, subject: [Scientific Advisory Board], 18 July 1994, SAB files.

3. The *Ancillary Volume* of the *New World Vistas* study contains the 16 speeches, a number of interviews done with many of the study's participants, as well as several long-term forecast essays written anonymously by members of the *New World Vistas* panels. *New World Vistas: Air and Space Power for the 21st Century: Ancillary Volume* (Washington, D.C.: USAF Scientific Advisory Board, 1995).

4. Memorandum for Lt Gen Richard Hawley, subject: [*New World Vistas*], 13 February 1995, SAB files.

5. General Corder's reply to Dr. McCall was excellent. "Wow," it began, and then expressed a keen awareness of the monumental task at hand while accepting the position. On file in SAB (1994) files.

6. Theodore von Kármán, interview with Shirley Thomas, January 1960, audiotape recording, Indiana University Special Collections.

7. Dr. Gene McCall to SAB members, ad hoc advisors, and invitees, 17 March 1995, SAB files.

8. Dr. Ivan Getting, interview with author, tape, National Academy of Sciences, 9–10 November 1994.

9. Dr. Sheila Widnall, press conference, videotape, Pentagon, 31 January 1996.

10. Teddy Walkowicz, "USAF Scientific Advisory Board: Hap's Brain Child," *Air Force Magazine*, June 1955, 50–54. Walkowicz wrote, "In a very real sense, this report was a product of the intimate friendship, confidence and mutual respect between the soldier and the scientist: Arnold and Kármán. Each explored the other's mind, and their associates left behind a legacy of imaginative, yet scientifically sound, planning to help insure the qualitative supremacy of American airpower." The second and third of these were the result of the Ridenour/Doolittle Report, September 1949, which recommended their development, among other reforms in Air Force science.

11. See *Summary Volume*, chapter 1, 3–13, in Dr. Gene McCall, *New World Vistas: Air and Space Power for the 21st Century*. This entire volume is only 70 pages long, not including appendices, and should be required reading for all Air Force personnel. Copies may be obtained through the USAF/SAB, Pentagon.

12. H. H. Arnold, "Science and Air Power," *Air Affairs*, December 1946, 190.

13. Theodore von Kármán, interview with Donald Shaughnessy, Columbia University Oral History Interviews, US Air Force Academy, Special Collections, Colorado Springs, Colorado, 10.

14. Dr. Gene McCall, interview with author, Beckman Center, Newport Beach, California, videotape, 13 July 1995.

15. *Summary Volume*, 54.

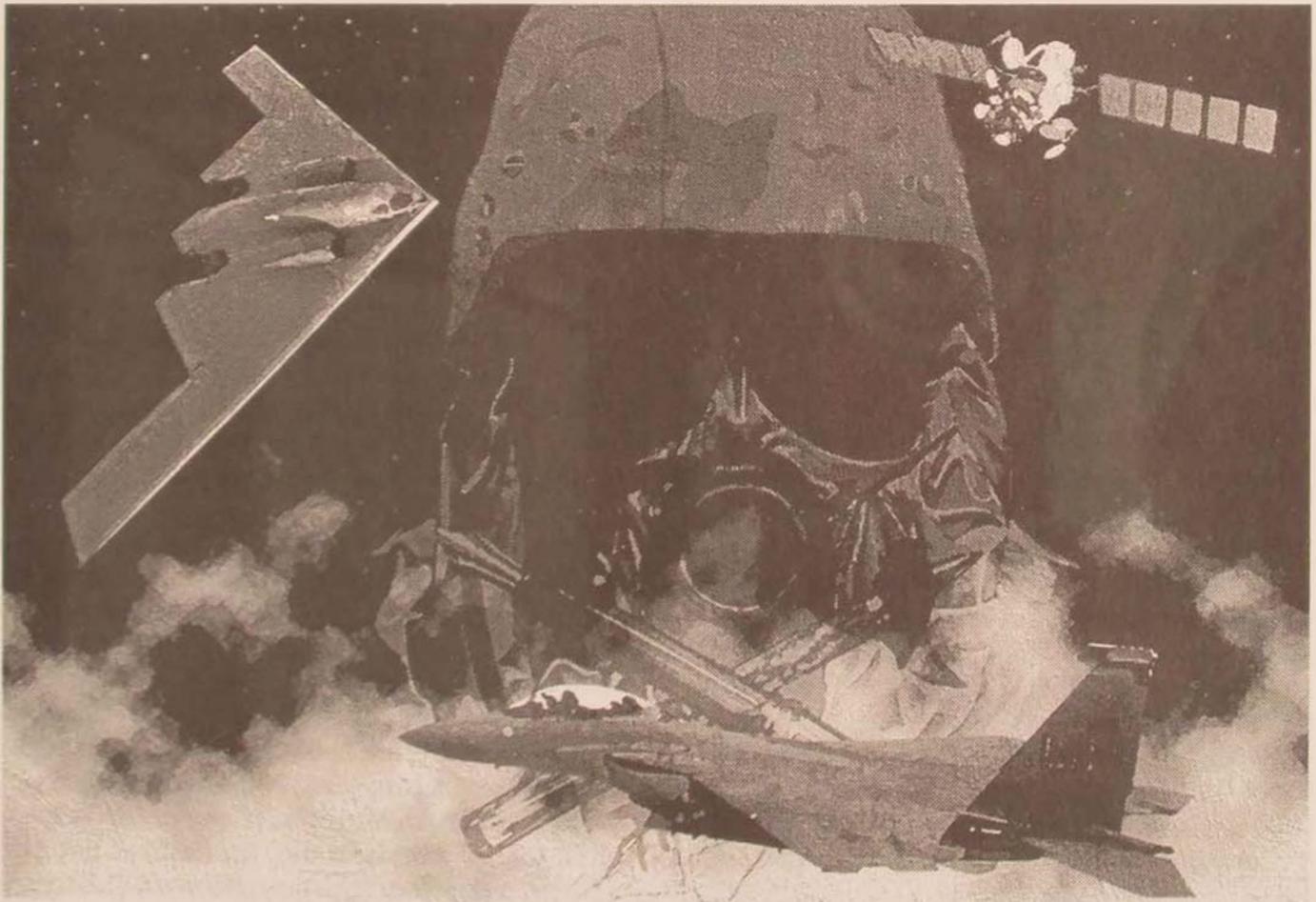
The Role of Aerospace Power in US Counterproliferation Strategy

DR. BERNARD I. FINEL

THE PROLIFERATION OF nuclear, biological, and chemical (NBC) weapons combined with the spread of ballistic and cruise missile technology is a significant threat to US foreign policy interests. In particular, this proliferation may significantly limit the ability of the United States to project power abroad, intervene in regional conflicts, and support American allies in crises and conflicts. The potential use of NBC weapons in a future conflict raises the possibility of increased US casualties and greatly complicates American use-of-

force decisions. This article examines the role of aerospace power in US counterproliferation strategy.

The US government's response to proliferation is multifaceted. The intelligence community, the Federal Bureau of Investigation (FBI), the Department of State (DOS), and the Department of Defense (DOD) all have significant nonproliferation and counterproliferation programs in place.¹ DOD, in particular, has focused on counterproliferation, developing efforts to prevent and reverse



proliferation through active and passive damage-limitation efforts.²

Although aerospace power will not be foolproof, in the absence of a comprehensive inspection regime it will form the best hope for avoiding the surprise use of WMDs.

Counterproliferation is different from nonproliferation. Nonproliferation focuses on trying to prevent proliferation directly through such means as export controls, multilateral regimes and treaties, and inducements to cooperation.³ Counterproliferation, by contrast, seeks to prevent proliferation by neutralizing the benefits of proliferation and to reverse proliferation through active military means. As such, counterproliferation can occur both concurrently with nonproliferation and as the basis for policy once proliferation has occurred.

Although nonproliferation and counterproliferation require the cooperation of many different agencies and departments in the US government, there is a special role for aerospace power. Aerospace power, as the name suggests, is the use of instruments of statecraft that rely upon travel through the air and space.⁴ Among the major elements of aerospace power are surveillance satellites, aerial sensors, space- and air-based missile defense systems, and air- and space-based military power including Air Force fighters, strike and standoff aircraft, Navy carrier aviation, and sea-based cruise missiles. Aerospace power has a number of specific attributes that make it an especially potent tool for counterproliferation policy. We can examine its utility by examining six major aspects of counterproliferation. This article also considers some of the limitations on aerospace power by considering its use in three situations: pre-crisis, crisis, and intrawar.

Six Aspects of Counterproliferation

Counterproliferation involves six major distinct activities, the first occurring before weapons or technology proliferate, and the remaining five occurring after proliferation has taken place. Counterproliferation is made up of the following elements:

1. Attempting to prevent proliferation through engagement activities such as extending security guarantees, supporting confidence-building measures such as increasing transparency, and helping support multilateral nonproliferation regimes;
2. Detecting the possession of weapons of mass destruction (WMD) by states and their intention to use them;
3. Preemptively destroying WMDs before they can be used;
4. Deterring the use of WMDs, particularly once a crisis has escalated to actual combat;
5. Protecting forces, logistical infrastructure, and civilians from WMDs through active and passive defense measures; and
6. Restoring contaminated areas after WMD use.⁵

An examination of these six goals in turn will help establish the importance of aerospace power to counterproliferation policy.

Engagement Activities

Aerospace power plays a critical role in sustaining the sort of engagement activities that might help prevent proliferation. First, it is important to consider that states often seek WMDs because of regional security concerns. The Indo-Pakistani nuclear competition is a prime example of this dynamic, as is the Israeli nuclear program and the now-dismantled South African nuclear program.⁶ Given that fact, there is some possibility that the United States could help prevent WMD pro-

liferation by judiciously extending security guarantees to insecure actors.⁷ The problem with extending security guarantees for non-proliferation purposes rather than narrow national interest is that the recipient of the guarantees may not believe the guarantees are credible.⁸ Furthermore, the American public may resist extending security guarantees if it believes that doing so will significantly increase the likelihood that US soldiers may be called up to defend these guarantees and hence be exposed to the possibility of casualties. Because aerospace power is able to strike at a distance and with great precision, the recipient of security guarantees may find them more credible.

US cold war security guarantees, both implicit and explicit, seem to have been very successful in preventing South Korea, Japan, and Taiwan from proliferating. These successes, not surprisingly, occurred in cases where US aerospace power was an especially potent threat given the geographical situation of these three countries. By contrast, Israel, France, and Great Britain decided to build nuclear weapons despite implicit and explicit security guarantees, perhaps because they wanted to bolster their own deterrence capabilities rather than rely completely on the US ground forces that a war would have required.⁹ Of course, all of these countries faced unique security challenges, historical legacies, and domestic constraints, but it does seem plausible to suggest that American security guarantees are more likely to be credible where American intervention can be accomplished exclusively or largely through relative low-casualty means such as aerospace power.

Second, aerospace power is crucial to building increased transparency in either bilateral relations or in support of an international regime.¹⁰ Since we might expect that counterproliferation in the future will rely at least in part on bilateral or multilateral regional arms control agreements, the United States will almost certainly be called upon to help guarantee that none of the parties cheat. Aerospace power in the form of unmanned aerial vehicles (UAV), satellites, and other sensor platforms will play an important role.

More generally, international regimes which rely on inspection systems, such as the Non-proliferation Treaty (NPT), Chemical Weapons Convention (CWC), and hopefully a strengthened Biological Weapons Convention (BWC) will be bolstered by aerospace-based transparency systems.¹¹

Detecting WMDs

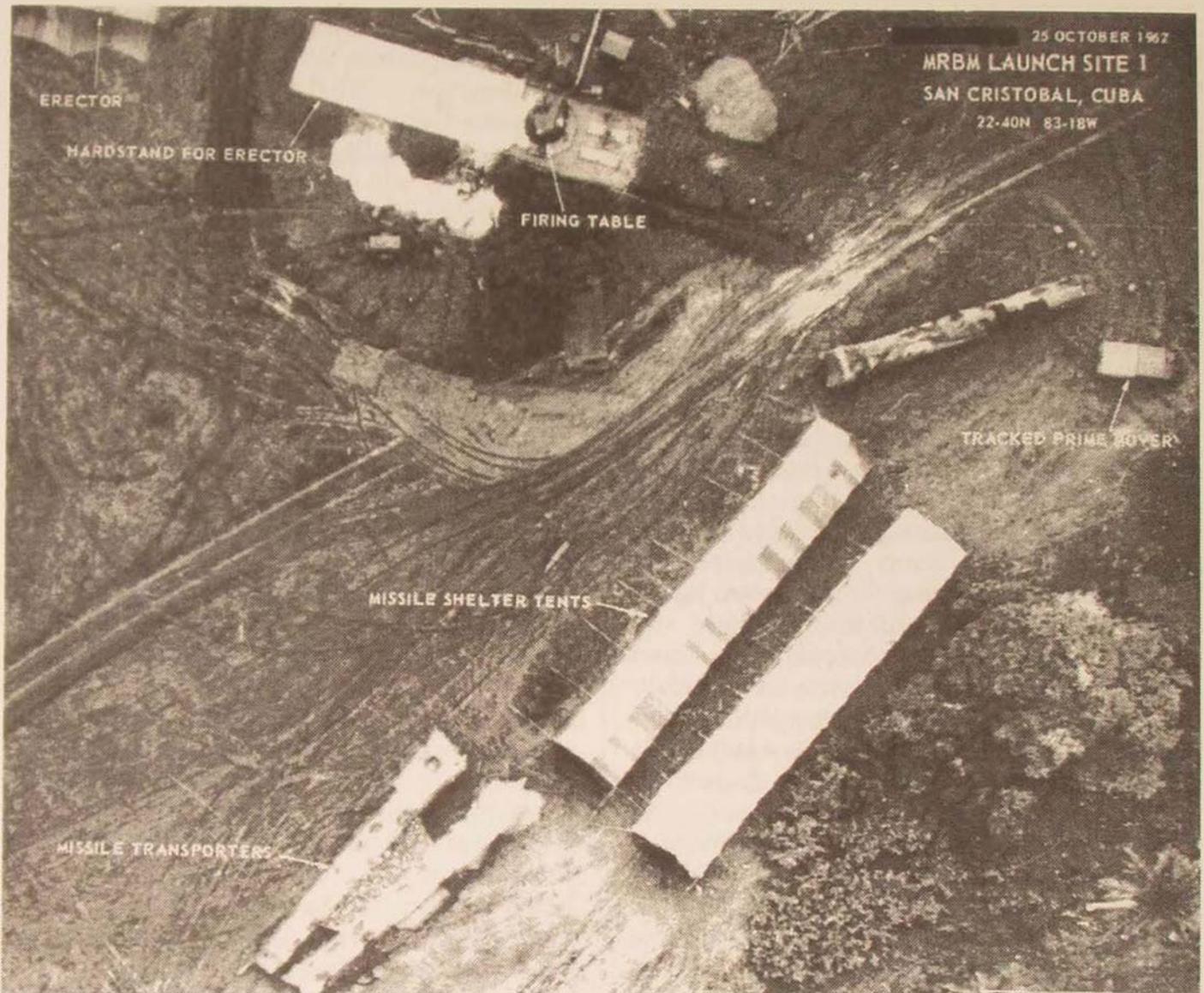
In terms of detecting the possession of WMDs and the intention to use them, aerospace power will be similarly important. Aerospace-based sensors will be crucial in detecting WMD manufacturing facilities and stockpiles. Furthermore, aerospace-based sensors will be crucial in developing timely warning about WMD stores being dispersed to combat units or fitted on long-range delivery systems. Although aerospace power will not be fool-proof, in the absence of a comprehensive inspection regime it will form the best hope for avoiding the surprise use of WMDs.

Ultimately, of course, aerospace power is only one part of a comprehensive transparency-building system. While aerospace assets can significantly increase the amount of information available, the difficult task is in interpretation and analysis.¹² The human element is thus crucial. Aerospace assets might thus be seen as a necessary but not sufficient element in a strategy based on transparency.

Preemptive Attacks

Aerospace power is also a potent tool if the United States chooses to destroy WMDs before they can be used. This sort of military preemption will require four basic characteristics. It will have to be (1) flexible, (2) capable of rapid response, (3) precise, and (4) able to strike targets deep within an enemy's territory. These characteristics are also the strengths of aerospace power.

However, preemption is also an inherently limited option. Preemption involves escalating a conflict or crisis and may not be politically possible for the United States. In addition, the requirements of preemption differ depending on whether it occurs in peace-



Airpower played a key role in the Cuban missile crisis. U-2 photo reconnaissance detected the site for initial preparations for surface-to-air missiles and medium-range ballistic missiles in Cuba, and aircraft monitored activities throughout the crisis (note the RF-101's shadow in the photograph on the opposite page).

time, crisis, or war. Furthermore, there is a fundamental difference between preempting WMD manufacturing plants and actual WMD munitions. While plants make visible, concentrated, high-value targets, WMD stores could be dispersed, hidden, and may (in the case of items such as chemical artillery shells) be too small and cheap to warrant the use of expensive platforms and munitions to eliminate them.

Deterrence

The process of deterring WMD use is also likely to rely heavily on aerospace power.¹³

There are two forms of deterrence: deterrence by punishment and deterrence by denial.¹⁴ Although the former is more obviously within the realm of aerospace power, aerospace power can also play a role in deterrence by denial. The important thing to remember about deterring the use of WMDs is that WMDs are not primarily military weapons but rather terror weapons. WMDs are probably not particularly effective in achieving traditional military goals such as the destruction of enemy military capabilities and the conquest and control of territory.

To deter the use of WMDs, deterrence by punishment requires the ability to threaten



credibly to inflict severe pain on a potential adversary. Fundamentally, given US power-projection capabilities, this sort of punishment will rely on aerospace power in its various forms—from aircraft to cruise missiles. However, the United States's ability to punish an adversary by airpower is variable. The key to punishment is to destroy assets the opponent particularly values. Are these assets targetable through aerospace power? The answer is not clear. Ultimately, many hostile regimes may only value their own leadership.¹⁵ Aerospace power may be able to undermine some of the bases of an adversary's leadership, but as the case of Iraq suggests, it

is difficult to bring down a regime with airpower alone.¹⁶ Even adjusting for the equivocal commitment to bringing down the regime in the Bush and Clinton administrations, it is difficult to conceive of an alternate target set that could have finished off the regime without some sort of intervention on the ground. It is difficult to undermine a regime by bombing it. Numerous studies have shown that civilians usually either rally around a leader or respond to bombings by becoming passive.¹⁷ The North Atlantic Treaty Organization (NATO) bombing of Serbia over the Kosovo situation has apparently weakened the regime of Slobodan Milosevic; however,

virtually all the large-scale demonstrations against Milosevic occurred after the bombing stopped and are as much a response to the failure of his policies as the suffering inflicted by the bombing.

Deterrence by denial is also more difficult than it might seem on the surface. Deterring the use of WMDs by denial does not only mean preventing an adversary from achieving military goals since WMDs are most likely to be used for political effect rather than narrow military missions. Rather, deterrence by denial in this context refers to steps which nullify the effects of WMDs. Since these effects are both military and political, the deterrence calculus is difficult to examine simply and precisely. That said, the inherent passive defense capabilities of aerospace power seem to make it an ideal basis for denying an adversary the ability to constrain US use-of-force decisions. Aerospace assets are difficult to target and hence can be used without exposing American soldiers to the effects of terror weapons. Certainly, the passive defense capability of aerospace assets does not prevent the use of WMDs against civilian targets, but it does limit the forward-deploying military assets that can be targeted. In this sense, the ability to fly high and fast is itself a form of deterrence by denial.

Force Protection and Active and Passive Defenses

This point about passive defense also speaks to the fifth element of counterproliferation policy—protecting forces, logistical infrastructure, and civilians from WMDs through active and passive defense measures. Aerospace power has an inherent advantage in passive defense, since its instruments are harder to target. This is especially the case as the Air Force moves forward on the concepts demonstrated in Expeditionary Force Experiment (EFX) '98.¹⁸ EFX '98 demonstrated a force deployment concept based on the use of a small forward logistical footprint. This approach effectively robs adversaries of valuable targets for their WMDs. Clearly, the Air Force needs to continue to work on this concept. Current Air Force plans to purchase

large numbers of F-22s, while allowing the longer-range bomber force to stagnate, will raise questions about the sustainability of extended small forward footprint campaigns because of the relative short range of small payloads.

Active defense initiatives will almost certainly rely on aerospace power. First, aerospace power will be crucial in tracking WMD assets before they are used. Second, aerospace power will be a necessary part of any attempt to destroy WMDs loaded on airplanes and missiles. Many theater missile defenses (TMD) rely heavily on aerospace assets in both the sensor and shooter phases.¹⁹

Restoring Contaminated Areas

The final aspect of counterproliferation policy, that of decontaminating affected areas, is the one area in which aerospace power is likely to play a minimal role. Although aerospace assets might be useful in spreading solvents or antidotes as well as tracking affected areas, on the whole, the unique role of aerospace power is limited. Indeed, civilian rather than military agencies, most notably the Environmental Protection Agency (EPA), Department of Energy, and the Centers for Disease Control (CDC) are likely to bear the brunt of restoration efforts.²⁰

In order to examine the role of aerospace power, it is also useful to consider three general scenarios for WMD counterproliferation. These are pre-crisis, crisis, and wartime situations, each of which raises a different set of objectives and constraints.

Counterproliferation in Peacetime

The vast majority of counterproliferation efforts occur prior to crisis or conflict with a proliferator. At this stage, the goal of counterproliferation policy is simply to prevent the proliferation of WMDs.

There are three basic processes inherent to counterproliferation at this stage. The first is to try to convince potential adversaries they do not need WMDs and cannot use WMDs.

This goal involves the positive aspect of engaging countries so that they feel secure enough to eschew WMDs. However, convincing states that they cannot use WMDs may involve the more confrontational posture of threatening to destroy WMD stores before they can be deployed and demonstrating the capability to intercept and destroy WMD delivery vehicles.

The second core process to counterproliferation in the pre-crisis phase is to convince potential suppliers they should not proliferate WMDs. This involves both positive and negative policies. Positive inducement includes appealing to norms, while holding out the possibility of extending benefits to non-proliferators. Negative inducements include sanctions and possibly even threats of retaliation should a state's activities lead directly to WMD development and use by another state. In other words, counterproliferation could include, for instance, striking North Korea if Iran uses North Korean missiles against the United States or a US ally.

The third core process in pre-crisis counterproliferation is the preventive use of force against a potential adversaries' WMD production facilities and stockpiles. This process seems self-explanatory, but as will be discussed later, it represents a much more complex task than most observers realize.

The role of aerospace power in effecting these three processes is significant. As mentioned earlier, aerospace power will play a crucial role in efforts to detect WMD programs and capabilities. Successful detection efforts may allow the United States to use preventive diplomacy—against both suppliers and proliferators—aimed at preventing the spread of WMDs. Clearly, satellites, UAVs, and manned reconnaissance aircraft will play a major role. However, the effectiveness of this sort of counterproliferation is very reliant on weak tools of statecraft. Diplomatic measures and sanctions are often ineffective against determined regimes.²¹

The involuntary reversal of WMD programs or the preventive use of airpower to destroy WMDs also suggests a strong role for aerospace power. In particular, the use of

precision-strike capabilities against WMD targets seems, on the surface, a likely role for aerospace power. However, when we consider the issue more carefully, it seems very unlikely that the United States would pursue such a course in a pre-crisis situation.

First, the United States should expect significant resistance from allies to this sort of military counterproliferation. Some US allies, particularly Japan and France, have historically been reticent about supporting American military actions. Indeed, the only two countries that have supported strong US military actions have been Israel and Great Britain. Ultimately, this represents an insufficient consensus for a broad-based counterproliferation initiative.

Second, the use of American military power in a pre-crisis counterproliferation role would hurt US standing and legitimacy in world opinion and in the United Nations. The lukewarm attitude of US allies mirrors the general unease in the international community with the notion of unprovoked military actions even in the counterproliferation area. Indeed, even when the provocation is great, the international community has been reticent to sanction the use of force. For instance, despite Iraq's clear violations of UN resolutions and evidence of its WMD facilities, the United States still had trouble building a coalition around the use of force. Indeed, in December 1998, when the United States and Britain finally responded to months of provocations with four days of air strikes, the People's Republic of China and Russia both reacted strongly, and most other countries were critical of the use of force.²² This response is especially chilling when we consider that Iraq is an extreme case: a brutal regime, guilty of violating UN resolutions, with a history of using WMDs against its neighbors and its own people.

Furthermore, there are also technical problems in targeting WMDs in a pre-crisis situation. First, striking production facilities is difficult because of the risk of collateral damage. Although the United States has made great strides in weapons accuracy, WMD facilities raise particular problems. Destroying a

biological weapons site may release infectious diseases, and attacks on chemical and nuclear weapons sites are similarly liable to contami-

Indeed, the use of military force in a counterproliferation role is a losing strategy in the medium to long term because the political effects of using force will tend to limit the possibility of using force in the future.

nate the surrounding areas. In some cases, WMD sites might be far enough removed from civilian areas to make such an attack possible, but in cases where WMD sites are tightly integrated into residential or even inhabited industrial areas, it may not be politically viable to risk contaminating innocent civilians. In addition, although the United States is developing the means of neutralizing biological and chemical agents as part of the attack—perhaps by using fuel-air devices capable of incinerating toxins—this sort of attack can have localized effects comparable to small nuclear weapons.²³ In other words, the heat and blast effects of fuel-air devices are such that they render the phrase “precise and limited” moot.

Targeting production facilities is also difficult because of the dual-use problem. This is especially true for chemical and biological weapons sites. Virtually any chemical plant can be converted to weapons production. Indeed, plants might be partially converted in such a way as to leave a plausible cover for the plant's operation. Similarly, virtually any pharmaceutical plant can be used to develop and produce agents for biological weapons. Identifying these facilities is thus very difficult from an intelligence standpoint, and the fact that the plants may be producing legitimate civilian goods as well as WMDs exacerbates the political problem with targeting such facilities. This problem was clearly visible in the strikes on the chemical plant in Sudan purportedly manufacturing VX gas for Osama

bin Laden. The legitimacy of this target is still being debated.²⁴

In any case, targeting WMD production facilities is at best a short-term solution. Although it may be possible to delay significantly the production of capital intensive weapons such as nuclear devices, most states, including rogue actors, have the technological know-how and the existing infrastructure to ramp up chemical and biological weapons programs very quickly.²⁵ Unless the United States can find ways to eliminate knowledge and skills as well, military counterproliferation may be at best a short-term solution. Indeed, the use of military force in a counterproliferation role is a losing strategy in the medium to long term because the political effects of using force will tend to limit the possibility of using force in the future. Seen in this light, the US and British attacks on Iraq in December were probably a victory for Saddam Hussein since the response of the international community would seem to virtually rule out future large-scale attacks. At the very least, Saddam Hussein has been able to eliminate the UNSCOM (United Nations Special Commission) inspection regime at a cost that he may judge tolerable.

The final role for aerospace power in a pre-crisis scenario involves establishing as a concept that WMDs will not deter the United States from intervening in local conflicts, nor will it limit US will. This goal represents a form of strategic control in that the intent is to prevent an opponent from determining the arena of conflict. As long as the United States is able to convincingly leave open the possibility of military action, US diplomacy is likely to be more successful. In short, the threat of force is significant even if it is not used.

This concept, however, is difficult to establish in practice. Even if the United States is able to demonstrate this willingness to use force, it is not clear that potential adversaries will learn the right lessons. Saddam Hussein, for instance, seemed to believe in 1990–91 that the United States would not go to war to liberate Kuwait. He held tenaciously to this belief despite the best efforts of the Bush administration, partly because he seems to have

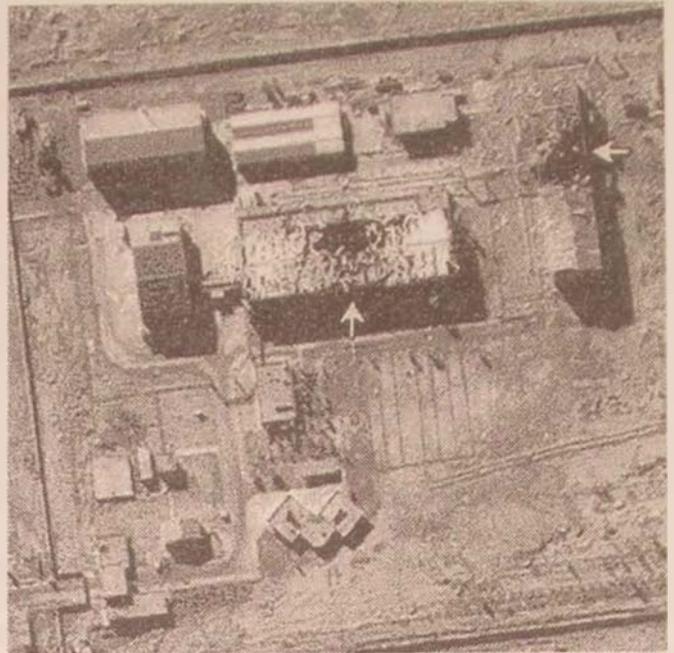
been misled by the lessons of Vietnam.²⁶ Misperceptions of this sort are very common in international affairs, and it is naive to assume that American policy will be able to communicate credibility with any sort of consistency.²⁷

Finally, it is important to remember that countries may have incentives to develop WMDs apart from trying to influence the United States. Ultimately India and Pakistan developed their WMD programs in response to regional security dynamics, including India's tense relations with China. And even if Iraq had no desire to prevent US interventions in the Persian Gulf, it would probably develop WMDs to balance against Iran and Israel. Prestige, domestic politics, and local security threats all play a large role in the calculus states face when considering whether to develop WMDs.²⁸ Thus, whether the United States is able to claim convincingly that it is undeterrable by WMDs may ultimately not be sufficient to prevent states from proliferating. The problem, of course, is that weapons developed against a regional adversary might still be used either politically or militarily against the United States in the case of a regional conflict.

Although at one level, pre-crisis counterproliferation seems especially promising, there are numerous political and military challenges to making this policy successful. Aerospace power will play a large role in any effective pre-crisis strategy, but ultimately counterproliferation will be a success or failure for broader reasons than simply the effective application of aerospace power.

Counterproliferation during Crises

Once a confrontation with a proliferator moves into a crisis, the dynamics of counterproliferation change significantly. The US goals once a crisis begins are to try to prevent the escalation of the crisis while preparing to intervene if necessary. These goals are partially contradictory, since preparation for war can often be interpreted as a hostile sign. Tension is particularly visible in the case of crises involving states with WMDs, since the



DOD photo (released).

The degrading of the infrastructure of Iraqi weapons of mass destruction during Operation Desert Fox is seen in this bomb damage assessment photo of the Shahiyat Liquid Engine Research, Development, and Testing Facility in Iraq. Gen Henry H. Shelton, chairman of the Joint Chiefs of Staff, made use of this photo on television on 20 December 1998.

incentives to preemption are high in the absence of deterrence based on the existence of secure second-strike forces.

There are several key processes involved in managing a crisis while preparing for the possibility of escalation. The first is that in such a situation, the United States must work effectively to signal the seriousness of the US commitment and interest in the issue at stake. International crises typically involve an element of communication. As states edge toward confrontation, they test one another's willingness to fight and the depth of their commitments.²⁹ They signal credibility through a combination of diplomatic and military moves.³⁰ The latter include increasing the visible activity and readiness of military forces, deploying troops and equipment closer to the area of battle, and perhaps even employing the exemplary use of force including demonstrations of live fire and challenges to the airspace and territory of the other state.

In this sense, efforts to signal credibility also serve to prepare for war. Assets deployed

to signal credibility may also be put in position to act if combat begins. Of course, these two processes are not identical. Actions designed to signal credibility may involve the deployment and movement of highly visible symbolic assets into dangerous, rather than militarily relevant, locations. Since the beginning of the cold war, the United States has used aircraft carriers often on this sort of mission. Examples are the confrontation with Libya over the status of the Gulf of Sidra in the 1980s and the passage of a carrier battle group into the Taiwan Strait during the 1996 crisis over the People's Republic of China's missile launches near Taiwanese ports.³¹ Neither of these deployments made *military* sense. There was no obvious military mission that would have required the United States to deploy assets that close to enemy capabilities.

Aerospace power, though well suited to military interventions against WMD states, may not be the most effective diplomatic and signaling tool. Ultimately, the very characteristics that make aerospace power militarily effective—standoff capabilities, long-range strike, precision, speed, and stealth—also limit its effectiveness as a signaling tool because it is less visible.

In addition to signaling, another key element of dealing with a crisis is to prepare for conflict by reviewing and expanding target sets against the potential adversary. Although many targets will already have been identified, the number of targets multiplies drastically once a crisis begins. Because a crisis implies a relatively short time frame to resolution or conflict, it makes sense to begin expanding the target set to include mobile assets, including military units, dispersed WMD stores, WMD delivery capabilities, and so on. This is a task well suited to aerospace-based sensors.

The role of US aerospace power during a crisis is significant. First, aerospace assets may be able to detect signs that an adversary has plans to use WMDs. For instance, aerospace assets may be able to spot the dispersal of WMD stores to field commands and may be able to spot the preparation of WMD launchers.

Second, given this potential to detect preparation for imminent use of WMDs, it

may be possible to strike preemptively at an adversary's WMDs. Unlike the pre-crisis situation, once a crisis begins the credibility of such a course of action increases dramatically. If the United States can develop clear evidence that an adversary is preparing to use WMDs, it will be much easier to convince the international community of the need and legitimacy to strike first.

Unfortunately, the task of preemption is likely to be more difficult. Prior to a crisis, the main targets for counterproliferation are WMD manufacturing facilities and WMD storage areas. Once a crisis begins, the adversary may disperse his WMDs. The result is that instead of striking fixed facilities, it may be necessary to target an ever-increasing number of sites as well as mobile assets. Dispersal dramatically complicates the counterproliferation task.

Furthermore, there is still a political tension in adopting a counterproliferation strategy in a crisis. In particular, there is the danger of striking too soon. Preemption effectively means giving up on crisis limitation. In other words, the tension between crisis management and preparing for conflict is reflected in the crosscutting pressures on preemption.

In addition, it is also important to consider the broader effects of planning for and executing preemptive strikes. The more the United States makes preemption a part of its policy, the more likely adversaries are to disperse early and grant use authority to lower-level commanders. Is it in the US interest to have WMD decisions being made at battalion level? Clearly, the answer is no.

Aerospace power is a credible way to signal commitment, since it is less vulnerable to WMDs on the whole. But, on the other hand, especially if the United States relies on deep strike, and small forward presence, the signaling effects will be limited. Furthermore, aerospace power does not eliminate the tension between crisis management and preparing for conflict.

Counterproliferation and Conflict

Finally, aerospace power has a role in counterproliferation policy once a conflict begins.

Although American strategists have considered the role of counter-WMD operations in a conflict, thinking on this issue has failed to consider fully the insights of the nuclear counterforce debates during the cold war.³²

Once a conflict begins, American goals are clear: Win the war while preventing use of WMDs against US forces. These goals can be accomplished through three core processes. The first core process is the establishment of an intrawar deterrent relationship. The second is to engage in both active and passive damage-limitation activities. The third is to destroy the enemy's ability and will to resist so as to end the conflict as quickly as possible.

Aerospace power plays a central role in all three of these processes. Although as in the pre-crisis and crisis situations, there are significant limitations on what aerospace power can achieve. The problems are not purely technical but also political and doctrinal.

Since aerospace power can strike deep into an adversary's territory, it can be used to hold enemy assets hostage. This capability is crucial in developing an intrawar deterrence relationship. The tension, however, is that the requirements of successful war fighting may conflict with those of building intrawar deterrence.

For example, should the United States strike at enemy leadership targets? Certainly, from a war-fighting perspective, it may make sense to do so—especially when dealing with centralized, developing countries. The leadership is probably the key target since in the absence of continued central control, the armed forces may simply cease fighting. However, from a deterrence standpoint, it may be wiser to hold the enemy leadership "hostage." Indeed, it may even make sense to allow them to keep a certain level of command and control so that they can maintain control over WMD use.

This "hostage holding" is, however, contrary to emerging US doctrine on information dominance, which holds that one of the keys to success in future conflicts is the rapid and total destruction of an adversary's command, control, communications, computers, intelligence, sensor, and reconnaissance (C⁴ISR) infrastructure.³³ With WMD-armed states, this sort of approach seems to under-

mine the possibility of intrawar deterrence; if the enemy does not know what has been hit, he does not know what has not and hence what is still being held hostage. Furthermore, with WMD-armed states, the real danger may come precisely when the other side is desperate from being blind and paralyzed.

That said, another problem arises: How can the United States let them know they are hostages? Demonstration strikes on some leadership assets combined with direct communication may be sufficient. But in the end, US policy will rely upon adversaries to understand the nature of the threat. They have to believe that they have a great deal still to lose by using WMDs, but this perception is difficult to establish.

Although intrawar deterrence is difficult to establish due to the communicative and perceptual aspects involved, there are more direct counterproliferation strategies available in conflict. The United States can use aerospace assets to engage in damage-limitation attacks. The first task would be to disable an adversary's ability to strike the United States with WMDs. In particular, US forces will need to destroy ballistic missiles before they can be launched and to develop active defense capabilities (ballistic missile defense), which will most likely be aerospace based. Ultimately, it should be possible to eradicate the short-term WMD threat to the US mainland since most countries are likely to have few intercontinental ballistic missiles (ICBM) capable of delivering WMDs to US territory.

However, pursuing this sort of damage limitation may be difficult for theater assets. At the theater level, an enemy will be able to deliver WMDs with shorter-range missiles, artillery shells, bombs, and even lower-technology systems. These are small and mobile and are likely to be dispersed. As the Scud hunts in the Gulf War demonstrated, even theater-range ballistic missiles can be hard to target, much less artillery shells. Furthermore, in discussing theater assets, it is likely that a damage-limitation campaign will be a time-consuming endeavor. Although we might be able to imagine a lightning campaign against an enemy's nascent ICBM force that could elimi-

nate the threat before it can develop, it will be much more difficult to preempt theater assets.

Perhaps the biggest danger in thinking about counterproliferation policy is to assume that the challenge is a puzzle to be solved once and for all.

The United States also needs to worry about the possibility of pushing an adversary into a "use-it-or-lose-it" situation.³⁴ If opponents rely on WMDs to limit losses in a conflict and the United States begins to degrade their WMD capabilities, then the adversaries may use WMDs as a form of damage limitation against the United States. In short, although the outcome is unpleasant to contemplate, it may be necessary to accept that WMD possession by an adversary does, in fact, limit US options.

Ultimately a future war with a WMD-armed adversary will need to rely on aerospace power. In a WMD environment, the combination of precision, speed, destructiveness, and greater inherent passive defense capabilities of aerospace power—including land-based strike fighters, long-range bombers, carrier-based aircraft, and cruise missiles—will probably ensure that aerospace power remains at the center of future conflicts.

Conclusions

With good information, aerospace power could be an ideal tool of involuntary counterproliferation. However, for political reasons, it seems unlikely that the United States will be able to use force against countries just for developing WMDs. In crisis or war the problem becomes more difficult because of the need to target WMD weapons systems rather than production facilities. Systems may be dispersed, and there may be tension among counterproliferation, crisis management, and intra-war deterrence. Regardless, however, because aerospace power can maintain a sustained cam-

paign from a distance, with an increasingly small footprint, it will play a crucial role in future conflicts against WMD states.

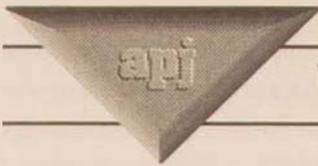
However, it is important to be careful when thinking about the future. In the United States currently, a particular threat model dominates strategic thinking. This model involves medium-sized developing states that are building a combination of WMDs and ballistic missiles. This model is relevant to such countries as North Korea, Iraq, Iran, and Libya. However, this is not the only possible model. If, by some combination of counterproliferation initiatives—including ballistic missile defense systems, prevention, preemption, and deterrence—the United States eliminates this model of threat, then another will arise. Perhaps the biggest danger in thinking about counterproliferation policy is to assume that the challenge is a puzzle to be solved once and for all. The United States should not base policy on the fallacy of the last move—that is, that adversaries will not be able to develop counterstrategies to US policies.

Consider, for example, cold war South African nuclear strategy that was based on internationalizing any conflict by demonstrating nuclear capability. The South Africans never intended to use their nuclear weapons in a military role. Instead, they simply planned to demonstrate a nuclear capability as a way of forcing the international community to intervene to stop whatever conflict was affecting South African security.³⁵ How would a nuclear demonstration in the midst of a crisis or conflict affect US strategy? Does an adversary need to actually threaten the continental United States or US forces to be effective?

There are no good answers to this sort of question. Certainly, the United States must consider itself vulnerable to political manipulation by WMD-armed opponents as much as to military intimidation. In the short term, a carefully considered policy based on the capabilities of aerospace assets may form the backbone of counterproliferation strategy. But in the future, the United States will have to remain wary and careful about the capabilities of adversaries. □

Notes

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6. Seymour M. Hersh, *The Samson Option: Israel's Nuclear Arsenal and American Foreign Policy* (New York: Random House, 1991); Waldo Stumpf, "South Africa's Nuclear Weapons Program: From Deterrence to Dismantlement," *Arms Control Today* 25, no. 10 (December 1995/January 1996): 3–8; Thomas Graham Jr., "South Asia and the Future of Nuclear Non-Proliferation," *Arms Control Today* 28, no. 4 (May 1998): 3–6.
7. Brad Roberts, "From Nonproliferation to Anti-Proliferation," *International Security* 18, no. 1 (Summer 1993): 168–69.
8. For a discussion of the importance of credibility in extended deterrence relationships, see Paul K. Huth, *Extended Deterrence and the Prevention of War* (New Haven: Yale University Press, 1988), 1–6; and Alexander L. George and Richard Smoke, *Deterrence in American Foreign Policy: Theory and Practice* (New York: Columbia University Press, 1974), 558–61.
9. The French, in particular, expressed doubts about the credibility of US commitments. Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: St. Martin's Press, 1983), 314–15.
10. Ann Florini, "The End of Secrecy," *Foreign Policy* 111 (Summer 1998); and Ronald B. Mitchell, "Sources of Transparency: Information Systems in International Regimes," *International Studies Quarterly* 42, no. 1 (March 1998): 109–30.
11. Amy E. Smithson and Michael Krepon, "Strengthening the Chemical Weapons Convention through Aerial Inspections," *Occasional Paper 4* (Washington, D.C.: Stimson Center, April 1991).
12. Bernard I. Finel and Kristin M. Lord, "The Surprising Logic of Transparency," *International Studies Quarterly* 43, no. 2 (June 1999): 315–39.
13. For an extended discussion of adapting deterrence to WMD threats, see Paul I. Bernstein and Lewis A. Dunn, "Adapting Deterrence to the WMD Threat," in Hays et al., 147–69.
14. George and Smoke, 46–55.
15. Many analysts argued that this was the case for the Soviet Union during the cold war. See Colin Gray, "Nuclear Strategy: A Case for a Theory of Victory," in Steven E. Miller, ed., *Strategy and Nuclear Deterrence: An International Security Reader* (Princeton, N.J.: Princeton University Press, 1984), 36–38. This argument may be even stronger in the case of "rogue regimes" whose leadership is often very narrow and rests on familial or clannish bases. See Raymond Tanter, *Rogue Regimes: Terrorism and Proliferation*, revised edition (New York: St. Martin's Press, 1999).
16. Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, N.Y.: Cornell University Press, 1996), especially 250–53.
17. *Ibid.*, 24.
18. Capt Tammie Grevin, HQ AFSPC Public Affairs, "Space Plays Major Role in EFX 98," Air Force News Service, 10 September 1998, Peterson AFB, Colo.; on-line, Internet, available from http://www.af.mil/news/Sep1998/n19980910_981370.html.
19. Office of the Secretary of Defense, *Annual Report to the President and Congress, 1998* (Washington, D.C.: Government Printing Office, 1998), 63–66.
20. Report of the Counterproliferation Program Review Commission (1997), appendix C.
21. Kimberley Ann Elliott, "The Sanctions Glass: Half Full or Completely Empty?" *International Security* 23, no. 1 (Summer 1998): 50–65; Robert A. Pape, "Why Economic Sanctions Still Do Not Work," *International Security* 23, no. 1 (Summer 1998): 66–77.
22. "Russia enraged over Iraq strikes, says relations with U.S. could deteriorate," Cable News Network, 19 December 1998; on-line, Internet, available from <http://www.cnn.com/WORLD/meast/9812/19/iraq.russia.01/>.
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24. Tim Weiner and James Risen, "Decision to Strike Factory in Sudan Based on Surmise," *New York Times*, 21 September 1998, A3.
25. Julian Perry Robinson, "The Supply-Side Control of the Spread of Chemical Weapons," in Jean-Francois Rioux, ed., *Limiting the Proliferation of Weapons: The Role of Supply-Side Strategies* (Ottawa, Canada: Carleton University Press, 1992), 63.
26. Alexander L. George, *Bridging the Gap: Theory and Practice in Foreign Policy* (Washington, D.C.: United States Institute of Peace Press, 1993), 84.
27. Robert Jervis, *Perception and Misperception in International Politics* (Princeton, N.J.: Princeton University Press, 1976).
28. Bradley A. Thayer, "The Causes of Nuclear Proliferation and the Utility of the Nuclear Nonproliferation Regime," *Security Studies* 4, no. 3 (Spring 1995).
29. Glenn H. Snyder and Paul Diesing, *Conflict among Nations: Bargaining, Decision Making, and System Structure in International Crises* (Princeton, N.J.: Princeton University Press, 1977), 3–32.
30. Huth, 199–213.
31. David S. Chou, "U.S. Roles in the 1995–96 Taiwan Strait Crisis," in Tai Wan-chin, ed., *The Security Relationship between the U.S. and Taiwan: After the 1996 Mini-Crisis* (Taipei, Taiwan: Tamkang University, 1997), 23–40.
32. See Charles L. Glaser, *Analyzing Strategic Nuclear Policy* (Princeton, N.J.: Princeton University Press, 1990), 207–56.
33. For a discussion of these issues, see Martin C. Libicki, *What Is Information Warfare?* (Washington, D.C.: National Defense University Press, 1995), 9–18.
34. See the similar argument of Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, N.Y.: Cornell University Press, 1991).
35. Stumpf, 5.



Men will always judge any war in which they are actually fighting to be the greatest at the time.

—Thucydides

OF WISHES, HORSES, AND HIGH-TECH WEAPONRY

DR. GRANT T. HAMMOND*

If wishes were horses, beggars might ride.

—English Proverb

COL JOHN WARDEN, USAF, Retired, has given us an insightful and at times compelling set of arguments for “The New American Security Force” (*Airpower Journal*, Fall 1999). It is an expansive vision and one that has much to commend it in many ways.

Unfortunately, it is also impossible to accomplish in the manner he suggests. Although the criticisms he renders are valid, the solutions are not. His vision is a seductive one and hardly novel. It is a consistent theme in Western civilization. John Milton spoke eloquently of it in *Paradise Lost*:

The remedy; perhaps more valid arms,
Weapons more violent, when next we meet,
May serve to better us, and worse our foes,
Or equal what between us made the odds,
In nature none.

(6.448–52)

The hope is that by keeping a technological edge, we may ensure continued superiority. Qualitative ascendancy will therefore enhance deterrence and preserve dominance. Unfortunately, what Colonel Warden wants is simply not attainable in the timescale, at the cost, or with the ease with which he imagines. Both individually and collectively, many of his criticisms are accurate and need to be addressed. Alas, the way in which

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Colonel Warden thinks these can be overcome is an overly simplistic and unrealistic approach to a set of very serious problems. He is right in his identification of the problems. He is wrong in his recommendations about how to go about fixing things.

Colonel Warden's chief concern is the time it takes to develop advanced weaponry. He would have us scale back the research and development (R&D) for complex weapons by a factor of three or more, from more than a decade to three years. As proof of our ability to do this, he cites numerous recent examples and claims that we can follow the same process in other technologies and weapons systems in order to produce a new generation of weapons systems every decade—not every 20 to 30 years. If this were possible, it would be wonderful. But it is not, for a variety of reasons. Colonel Warden makes the following assertions. With the exception of the first, which is correct, all the others are flawed at best, if not outright wrong.

**“US force structure can no longer be based
on response to a threat.”**

On this, Colonel Warden is absolutely correct. The world we confront is largely unknown and in many ways unknowable in terms of future threats to our security. There are as many threats as there are would-be miscreants or defense contractors to conjure them up. Trying to prepare for all contingencies is impossible and may not increase our security. We can and should prepare to accomplish our objectives. These are within the span of our control, and to the extent we are focused on them, we are likely to be better off than worrying about a dizzying array of threats produced by contractors with a virtually limitless supply of possible scenarios. The hard part is to prepare as best we can for the relevant probabilities and to be adaptive to the contingencies that arise. We must be prepared for the wars of necessity. We can say no to those of choice.

**“[We will need to have] multiple attack (and defense) platforms
and weapons that capitalize on the latest technologies.
Potential enemies will have little or no chance
to develop appropriate defenses.”**

This would be nice, but as the system costs grow and the unit costs within them, particularly if small numbers are acquired, our ability to have multiple systems for the same tasks is likely to become sharply curtailed by cost factors alone. Indeed, given the low expenditure on defense as a percentage of gross domestic product (GDP), we are in a position of having to choose to develop one multipurpose system rather than develop multiple systems dedicated to the same roles and missions, as we have been able to do in the past. To illustrate what has happened, at the time we were developing the U-2 in 1965, the Department of Defense's (DOD) share of the

federal dollar amounted to 25.2 percent of net public spending and 38.8 percent of all federal outlays. In fiscal year 2000, the figures are 9.1 percent and 14.8 percent, respectively.¹ That is, the relative level of effort exerted in spending on defense was two and one-half times greater in 1965 than it now is. Unless the DOD budget expands dramatically, we have a problem.

“We must shorten weapon-system development cycles (not more than one to three years). . . . By 2010, the United States can have a minimum of eight to 10 new major weapons platforms . . . and a greater number of new weapons. . . . This force can have many times the impact on an opponent than what is currently available.”

The military programs Colonel Warden most often refers to were covert (“black”) and developed outside the normal procurement channels. Making all weapons systems black programs is simply not possible. Those that he most often refers to (the U-2, SR-71, 777, and the F-117) were not all developed in his three-year standard. The Boeing 777, a civilian transport, was six years in full-scale development (from June 1989 to April 1995), and the F-117 took five years from test design and prototype through full-scale development (November 1978 to October 1983).² The F-117 was virtually hand built using stealthy composites, and a great deal of the learning that occurred was in the production of the aircraft itself—not the design and development of it. Most systems now in use took eight to 13 years to develop³ and an additional two to five years to reach initial operational capability.

Beyond these considerations, this sort of timetable for weapons-system development is simply not possible without a major change in the international security environment in which we find ourselves *and* in the domestic consensus regarding defense. As Harry Truman is reported to have said upon receiving NSC[National Security Council]-68 (“United States Objectives and Programs for National Security”), “I’d have to scare hell out of the American people to do this.” Luckily, Kim Il Sung obliged by invading North Korea. Without such a major threat to US interests, we will not invest in “eight to 10 new major weapons platforms . . . and a greater number of new weapons.”

These new weapons—if they were affordable, if they could be developed in the time frame he envisions, and if they were deployed in sufficient quantity to have significant impact—would be desirable. But we won’t have them by 2008–10. The modernization “wish list” for the services has outstripped planned procurement by nearly \$400 billion.⁴ And those programs are in competition with increased concern about training and readiness, contingency operations, recruitment and retention, and retirement and health care as well as pay and quality-of-life issues for the US military.

“Each new platform system will have only a small number of ‘vehicles’ (not more than 20 to 30 in most cases) [using] small, one-time production runs.”

The notion of building small numbers of advanced systems is enticing but erroneous. First, the great bulk of the costs is in the R&D and production capabilities to produce the first one, regardless of the size of the buy. Second, the greater the unit costs, the smaller the number acquired. Witness the B-2, which costs \$2.2 billion per copy for 21 instead of the originally forecast \$437 million per copy for a buy of 133.⁵ Even worse, there is a “break-even point” for operations and maintenance (O&M) costs in terms of spare parts, technical training, and so forth, that is greater than the small numbers Colonel Warden envisions. We have 21 B-2s—not the 133 originally requested and far fewer than the 66 touted as the break-even O&M point. A smaller number of aircraft means that the O&M costs themselves escalate each year, thus adding even more to the life-cycle costs of the system and competing against other modernization for the future in terms of readiness for existing systems.

“The cost [of such systems] will be less on a yearly basis than that for today’s force . . . and will be a decreasing percentage of the gross domestic product.”

Would that it were so. This assertion cannot be proven in advance of the actual development of the “paper airplanes” to compare with actual ones now in the inventory. Virtually every new fighter has been sold on the basis of vastly increased technological capability and quality compared to existing inventory. Furthermore, contractors and senior Air Force officers have assured us that because of the advanced technology, the new system would have lower maintenance costs, resulting in a savings that would help offset the increased costs of acquiring it. If experience is a guide, such savings are illusory. In reality, succeeding systems, since they are more complex, tend to cost more, not less, to maintain than their predecessors. And procuring small numbers of them means that individual spare parts and the maintenance structure to support them would be vastly more expensive than on larger buys.

“Development and fielding of this force can be done but only with a . . . cultural change.”

Undoubtedly, the acquisition and procurement systems are broken. A variety of presidential commissions, task forces, and review panels have been telling us as much for 30 years or more. We are, as Colonel Warden correctly points out, in need of a cultural change in how we go about designing and procuring weaponry. But the force he envisions cannot be

developed without a massive change in the strategic landscape, a sea change in domestic politics, and a better way of procuring affordable weapons that are good enough, not perfect. Furthermore, the constant effort to achieve not state of the art but “state of the art of the technology after next” in the development cycle may be both unaffordable and foolish. If there is a strategic pause at the moment with no major threat, we have the option—if not the necessity—to choose a Mark II or Mark III version of a capability. We need not rush headlong to procure the latest gleam of technology to come down the pike, as we did in the throes of the cold war.

Despite my misgivings about the specific remedies envisioned by Colonel Warden, I am in sympathy with the general direction of his suggestions. We need to streamline the acquisition process. But as long as it is a political football, more sensitive to the concern for federal jobs and dollars in the districts of a “Defense Committee” of 535 members of Congress than to the national security strategy and national military strategy, streamlining will be difficult, if not impossible. But we could reform the Pentagon’s accounting systems—all 122 of them—and make audits of individual programs possible through the use of double-entry bookkeeping. We can rationalize a system in which war games and doctrine battles are stalking horses for budget share and procurement dollars. Surely we can keep better books. And we need to think more intelligently about the capabilities we require to accomplish our objectives rather than merely focus on the threats that may—or may not—come to pass. We need a New American Security Force. But we cannot afford, do not need at the moment, and ought not to pursue the one recommended by Colonel Warden. We do, however, need to pay attention to the general thrust of both his criticisms and his vision. Business as usual will no longer suffice.

Maxwell AFB, Alabama

Notes

1. Office of the Undersecretary of Defense (Comptroller) FY 2000 Budget Materials, table 7-7, “DOD’s Slice of the Dollar,” 12 March 1999; on-line, Internet, 8 September 1999, available from <http://www.dtic.mil/comptroller/FY2000budget/GREEN2000.pdf>.

2. See the excellent study done by Mark A. Lorell and Hugh P. Levaux, *The Cutting Edge: A Half Century of Fighter Aircraft R&D*, Project Air Force (Santa Monica, Calif.: RAND, 1998), particularly the data in appendix B, 170–200.

3. Ibid.

4. See Ernest Blazar, “Off the Rails,” in his column “Inside the Ring,” *Washington Times*, 6 July 1998, 7.

5. The current unit cost of the B-2 is more than five times the original projected cost. See Kathryn Schultz, “Escalating Costs of the B-2,” in “The B-2 ‘Spirit’ Bomber,” 1 May 1996; on-line, Internet, 8 September 1999, available from <http://www.cdi.org/issues/aviation/b296.html>.

Ricochets and Replies*Continued from page 3*

blood, and every airman who currently serves in the United States Air Force. The current proposal for an Air Force memorial does not accomplish any of these things; it represents neither our history nor us. The members of Flight 66, ABC Class 99A, on whose behalf this letter is submitted, do not intend to be divisive. We realize many will say that it is too late, but we urge that this design be reconsidered.

2d Lt Joseph Babboni, USAF
Maxwell AFB, Alabama

EDITOR'S NOTE: This is reminiscent of the early architectural debate surrounding the Air Force Academy Cadet Chapel, which has become a huge attraction, a source of pride among cadets and graduates, and the winner of the prestigious 25-Year Award of the American Institute of Architects in 1996. It is difficult to memorialize an Air Force with a strong but complex identity made up of people doing vast and diverse functions. That aside, APJ appreciates the input from new members of the profession and applauds their courage of conviction in expressing personal opinion.

Aerospace Power

Chronicles

The New Millennium Challenge

In response to the challenge to make better use of all of our resources as we move into the new millennium—and in keeping with the transformation of *Airpower Journal* to *Aerospace Power Journal*—*Air Chronicles*, a state-of-the-art on-line publication, has become *Aerospace Power Chronicles*. *Chronicles* gives Air Force officers and others the opportunity to become familiar with issues of professional development in the year 2000 and beyond, engages them in interactive research, and provides forums for discussion.

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Luetwinder T. Eaves
Managing Editor
Aerospace Power Chronicles

EDITOR'S NOTE: Regular readers of *Net Assessment* will notice some changes to our format, beginning with this issue. As part of our ongoing effort to broaden our book-review section to include any and all materials relating to professional development, material formerly featured in the *Airpower Professional's Book Club* (see *Spring and Summer 1999*) will now be included in *Net Assessment*.

For example, in this issue we lead off with Maj Chris Nowland's comparative book review of Air Vice Marshal Tony Mason's *Air Power: A Centennial Appraisal* and Col Mike Worden's *Rise of the Fighter Generals: The Problem of Air Force Leadership, 1945–1982*. Dr. Dave Mets recommended this review as among the best from his recent class at the School of Advanced Airpower Studies. At the end of *Net Assessment*, you will also find a list of recommended readings on leadership supplied to us by Col Dale O. Condit, USAF, Retired. For more on Dr. Condit's reasons for submitting this list, see his letter to the editor in this issue.

Finally, we wish to correct an error that appeared in the *Net Assessment* of Fall 1999. In her review of Brian Mitchell's *Women in the Military: Flirting with Disaster*, Capt Rosemary King wrote that "[Mitchell] accuses feminists of encouraging soldiers to 'think of all humans as human beings first rather than animals to be casually slaughtered'" (page 108). Mr. Mitchell has since contacted us to point out that this quotation is misleading by implying that these are his words. Actually, Mitchell was quoting three unnamed representatives of the American Civil Liberties Union. We regret the error.

Maintaining Altitude in Turbulence

Change in Airpower

Air Power: A Centennial Appraisal by Air Vice Marshal Tony Mason. Brassey's, 8000 Westpark Drive, McLean, Virginia 22102, 1994, 320 pages, \$36.95.

Rise of the Fighter Generals: The Problem of Air Force Leadership, 1945–1982 by Col Mike Worden. Air University Press, 170 West Selfridge Street, Maxwell AFB, Alabama 36112-6610, March 1998, 281 pages, \$18.00.

After reading *Air Power: A Centennial Appraisal* and *Rise of the Fighter Generals*, one might conclude they have little or nothing in common. Mason's book traces the history of airpower from an obscure conference in 1893 to NATO action in Bosnia, searching for recurrent factors that affect the use of airpower. Worden's book explores the institutional dynamics of the US Air Force for a specified time period, searching for trends in education and organizational bias to explain how the service selected its senior leadership. The two subjects hardly seem related upon first glance, but further analysis reveals that both books explore an important aspect of airpower—change.

Both of these authors use adaptation to change as a vehicle to explore the evolution of airpower. On the one hand, Mason considers airpower's evolution into a mature element of modern warfare and explores how this maturation should relieve airmen of the need for zealots. He contends that these absolute airpower purists need a more pragmatic view of airpower that can articulate its limitations and advantages across the broad spectrum of conflict. Mason also answers the "how" and "why" questions regarding the maturation of airpower in this century. On the other hand, Worden discusses how people within the Air Force have dealt with the changing nature of airpower; explores the lasting impact of World War II, Korea, and Vietnam on the service; and addresses educational trends and organizational dynamics that have affected it. He uses people to explain Air Force ideas and doctrine and answers "what" and "why" regarding the changing nature of airpower in the Air Force.

Notice that both authors attempt to answer the "why" question. Their motives are similar in that they desire to create criteria that airpower advocates can use to help steer the proper application of airpower. Ultimately, both advocate a pragmatic

view, Mason emphasizing a mature application of airpower to achieve political objectives and Worden stressing the need for a diverse Air Force leadership that can understand all of its aspects.

Two underlying themes run throughout each book: (1) the impact of the early airpower zealots' quests for independence and the implications of their approaches and promises and (2) the airpower debate over the decisiveness of strategic bombing. These themes interact within the undercurrent of change, which involves moving from an era of total war to limited war; from an Air Force leadership of airpower absolutists to one of airpower pragmatists; from technology that allowed only bombers to perform strategic missions to one that permitted fighters to do so; and, finally, from a reliance on nuclear weapons to a reliance on precision-guided munitions.

One should not be surprised that Air Vice Marshal Tony Mason has produced a credible book on airpower. A professor of aerospace policy in the Department of Political Science and International Studies at the University of Birmingham, England, he is a long-time airpower advocate, has lectured worldwide, and has published several other books on airpower.

His thesis in *Air Power: A Centennial Appraisal* is that airpower's "relevance to any crisis or conflict, like all other kinds of military power, should be determined by policy. To that end there needs to be an understanding of the resources required to nourish it, the extent of the contribution it can make, and the recurring factors which may tend to constrain it" (xvi). He cites examples from history to elucidate these factors, which statesmen and airmen need to understand. Other themes developed in his overview of the last one hundred years of airpower history include the tendency of airmen to overstate airpower's capabilities, which originated with the early advocates of strategic bombing. He contends that this overselling of airpower has "resulted in disappointment and reaction" from advocates and critics alike (xv). Another theme argues that airpower is mature enough to undergo examination in the context of warfare in general—that is, it is "susceptible to the principles and influences akin to those which have affected the evolution of both seapower and land forces" (xvi). Yet another theme maintains that security in the next century will involve complex factors but that airpower will make a greater contribution in the next century than it did in this one.

Mason's sources for this book are credible and wide ranging. Notably, he mines Sir Hugh Tren-

chard's diary, uncovering evidence that challenges the generally held opinion of Trenchard as the willing father of strategic bombing. He argues that Trenchard grudgingly took charge of the "Independent Force" (31), that he supported strategic bombing only after the defeat of German aviation on the battlefield, and that he had "no illusions whatever about the theory and reality of strategic bombardment" (33).

Mason unearths several nuggets about airpower. For example, he surprisingly and effectively argues that the most important technological advance in airpower is the microprocessor: "More than any other single invention the microprocessor would enhance the attributes of air power and reduce the penalties of heavier-than-air operations" (62).

He also explores fertile ground in discussing how airpower played a unique role in the arms-control agreements with the Soviet Union by detailing Soviet views of NATO airpower and demonstrating how airpower served as an effective threat to the Soviets. However, he emphasizes the context of the disarmament agreements, explaining how the thawing of relations between the superpowers allowed the transformation of collective security to the new concept of cooperative security (135).

Subsequently, Mason details important lessons in countering the domination of airpower that future enemies might learn from the Gulf War. These include the use of asymmetrical means—employing mines and Scud missiles as well as manipulating time to prevent a coalition's land-based air forces to build up.

Mason makes the point that peacekeeping activities present unique problems for airpower. Ultimately, he thinks that national will is the true weakness in peacekeeping operations and asserts that a resurgent Russia is the only country with a chance to challenge US preeminence in airpower. Mason envisions a revitalized Russia adopting a new air-centric doctrine that would incorporate lessons from the Gulf War and use Western-style training to increase Russian effectiveness.

Finally, the author addresses the future of airpower, arguing that no one will be able to challenge the US lead in pure airpower but warning that nations will use technology and information to asymmetrically challenge US hegemony in pure combat forces. These asymmetric attacks will take place in "an electronic environment affecting communications, navigation, target acquisition, weapon delivery, and precision guidance" (241). Mason then explains how the future of airpower in

Europe lies with cooperative security and details several options for making it work. Most importantly, he urges shared values and shared capability. He concludes with a plea to end airpower zealotry, insisting that airmen discuss airpower with maturity and acknowledge what it can and cannot do: "They do not need any longer to exaggerate air power's potential, nor to project universal 'lessons' from individual successes. By placing air power in the evolutionary process of warfare as a whole, unnecessary claims of superiority and unfounded fears of subordination may be abandoned along with the growing pains of infancy and adolescence" (278).

Air Power: A Centennial Appraisal does have two minor problems. First, some of Mason's numerous quotations from other published works may be taken out of context, thus possibly leading to misrepresentation of the other authors' original intent. Second, although Mason discusses the United States, Israel, and the Gulf War coalition, the overall feel of the work is European. However, neither of these problems, which perhaps simply reflect the mind-set of the British author, detracts from the value of the book.

Certainly, the British influence does not hinder the presentation of the material, which is coherent and easily digested. The first three chapters, which are sweeping historical studies of the evolution of airpower, lay the foundation for Mason's more detailed analysis of airpower's role. A reader who has no knowledge of airpower may find the review breathtaking and difficult, but for the experienced airpower professional, it serves as a useful stepping-stone for more in-depth analysis of current airpower issues.

Air Vice Marshal Tony Mason has skillfully blended evidence and critical thinking to present provocative possibilities for airpower into the twenty-first century. At the same time, as a man who values airpower, he wants *Air Power: A Centennial Appraisal* to act as a bold, flashing warning for both airmen and statesmen by calling their attention to threats that lie immediately ahead.

To his critics, Col Mike Worden would appear to be an anomaly—a highly educated fighter pilot. Recipient of both a master's and a PhD degree in military history from Duke University, he took part in combat operations as a commander in Operations Desert Storm and Provide Comfort. In *Rise of the Fighter Generals*, he contends that World War II, the quest for service independence, and the development of nuclear weapons reinforced the Air Force leadership's embrace of the doctrine of strategic bombing. From this core group of officers

who believed absolutely in the decisive nature of strategic attack, the early Air Force leadership would emerge. But the unique circumstances of limited war and America's traumatic involvement in Vietnam led to a new, more pragmatic group of Air Force leaders—mainly fighter pilots who had operated closely with the Army in Vietnam and had a greater appreciation for the synergistic effects of land power and airpower. Their ability to adapt to new political and cultural realities allowed them to replace the bomber generals as leaders of the United States Air Force. Worden also explores the decisive and independent nature of strategic bombing and the value of diversity in education and leadership, especially in terms of fostering creative thinking.

Worden fills a void in airpower study by examining the Air Force leadership to determine where it came from and, more importantly, why it arose. In determining the origins of this leadership, Worden also reviews 37 years of Air Force thinking and doctrine, illustrating the organizational dynamics of the Air Force in reacting to change and acting as a road map for future change.

Worden's book has no stunning revelations; rather, it chronologically documents significant events that resulted in organizational changes in the service. The author first considers the legacy of World War II and the quest for independence: "The World War II generation valued experience over education and discipline over critical analysis. They were doers not thinkers" (16). This generation of leadership also had absolute faith in strategic bombing, in the service's latest assets—nuclear weapons—and in its greatest leader—Gen Curtis LeMay. The Vietnam War generals, however, "exploited internal institutional dynamics and grasped new external demands on the military profession better and . . . were influenced by rapid technological, economic, and political change. This development required education, flexibility of mind, and breadth of military and Capitol Hill experience" (235).

Worden details how the Air Force marketed the vision of strategic bombing within the framework of the Korean conflict and how the senior leadership interpreted incorrect lessons from the conflict. According to him, the senior leadership thought that "Eisenhower's threat to use atomic weapons made the difference, and once more airpower could claim the starring role" (42). He also explains how Korea affected tactical aviation, relegating Tactical Air Command (TAC) to secondary status. Worden further enlightens us regarding the ascendancy of Strategic Air Command (SAC) and

the importance of LeMay. Ironically, he reveals how Soviet deception at the Tushino air show resulted in Congress's granting \$928.5 million to SAC to bolster strategic forces.

Furthermore, the book addresses the issue of parochialism between the tactical and strategic forces, noting TAC's reluctance to accept strategic missiles and the SAC mind-set, which, according to Worden, stymied innovation: "[Bomber crews] had been screened for reliability and dependability and had grown accustomed to close supervision, routine, and disciplined procedural compliance. LeMay preferred control and centralization, especially when stakes were high" (61). Contrast this situation to his description of the fighter community, which "encouraged innovation and delegation. It demanded aggressiveness, flexibility, and versatility" (237). The author believes that such a cultural difference in the commands is partly responsible for the ensuing swap in leadership within the Air Force.

Worden does a good job of examining how the concept of flexible response and the increase in educational level within the Air Force leadership resulted in a broader view of airpower and a weakening of the absolutist position. However, he also shows how the senior leadership failed to respond to change and clung to the decisive strategic-bombing paradigm, which resulted in the Air Force's entering Vietnam ill prepared.

Worden's analysis indicates that Vietnam was the turning point for leadership in the Air Force, which was involved in a limited war with a total-war force: "Growing involvement of the tactical air forces in Southeast Asia necessitated a rebuilding of TAC. However, [Gen John P.] McConnell [Air Force chief of staff] inherited a bomber-dominated senior leadership and a long-subordinated minority of fighter generals" (168). Vietnam made it clear to General McConnell that a change in leadership was necessary. Consequently, McConnell initiated the changes that tipped the balance of senior leadership from bomber pilots to fighter pilots. Unfortunately, Worden ends his study with the fighter generals in charge without determining whether that leadership perpetuates the cronyism that existed in the SAC-dominated Air Force.

I find four problems with *Rise of the Fighter Generals*. First, by narrowly focusing on organizational experience and education in his examination of leadership, Worden neglects other contextual factors, such as budget and interservice pressures. Second, Worden suggests that leadership is the sole cause of the changes the Air Force experienced. Rarely are such monolithic explanations of change adequate.

Third, the author's broad generalizations regarding individual motivations and capabilities, which are necessary when one considers institutional dynamics, leave an impression of a cookie-cutter approach to leadership selection. This serves only to diminish the richness of the individual stories of the service's stellar leaders. Fourth, by establishing a causal relationship between aircraft selection and leadership, Worden fails to explore changes in undergraduate pilot training that may have directly influenced student perceptions or options concerning aircraft preference.

Worden effectively blends evidence and sound reasoning in producing a book that is straightforward, easy to read, and appropriate for anyone interested in Air Force history. Although he attempts to present his material objectively, his writing style is at times incendiary and arrogant. Indeed, his treatment of SAC's mind-set may anger people loyal to that command, and his inference regarding B-52 abort rates in Vietnam is certainly provocative.

Air Power: A Centennial Appraisal and Rise of the Fighter Generals are valuable for their insights concerning airpower's reaction to change. Mason's macroview of airpower reveals an evolutionary advance while Worden's narrower view of an institution reveals an organizational shift forced by the trauma of Vietnam. Both authors want airmen to articulate realistic capabilities and limitations, Mason maintaining that airpower's maturity precludes the necessity of any argument offered by zealots about its decisiveness and Worden warning against the tactical-air zealot who responds to SAC's oppression by making the same mistakes, resulting in a first- and second-team Air Force. Ultimately, Worden argues for diversity and breadth of experience, both educationally and operationally within the service's leadership.

If these two books whet the appetite of *APJ* readers regarding change in the military or the responses of early Air Force leaders to change, they should read *Winning the Next War: Innovation and the Modern Military* by Stephen Peter Rosen, and *Building a Strategic Air Force* by Walton S. Moody. Rosen provides excellent insight into military innovation, both in wartime and peacetime, while Moody addresses decision making by early Air Force leaders as they responded to world events. Both books will help airmen develop an appreciation for the difficulty of maintaining altitude in the turbulence of change.

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Coercive Military Strategy by Stephen J. Cimbala.
Texas A&M University Press, John H. Lindsey
Building, Lewis Street, College Station, Texas
77843-4354, 1998, 240 pages, \$39.95.

The United States is no longer fighting the cold war, and the strategies of mutual assured destruction (MAD) and strategic nuclear deterrence are no longer sufficient. With military operations in the post-cold-war era more likely to fall into the category of military operations other than war (MOOTW), including counterdrug and peace-keeping operations, we need a new strategy. In his book *Coercive Military Strategy*, political scientist Stephen Cimbala argues that this new face of war requires a different way of looking at strategy. Cimbala recognizes that MAD is not a strategy for the future, and he introduces the concept of "coercive military strategy" to replace those strategies prevalent during a time when everyone assumed that the use of nuclear weapons was inevitable.

Coercive military strategy, as Cimbala defines the term, employs specific, graduated means to achieve policy objectives while adjusting the means and ends to the particular conflict or situation. Since the possibility of total war is now remote, policy makers need a tool that is more compromising than the threat of total nuclear annihilation. He promotes this idea successfully because he has accurately assessed a void that we need to address. Although coercive military strategy may not be a new idea, Cimbala articulates it in such a way that it becomes newly relevant.

It is not surprising that the author argues so effectively for the need of coercive military strategy since he has written almost two dozen books on international strategic issues. As in many of these other works, Cimbala uses historical examples of successes and failures of coercive military strategy to create a prescription for its use in the future. This method of using historical examples to support his point is effective because it compels the reader to reach the only sensible conclusion—that coercive military strategy is a necessary tool for future strategists because, without it, they will find themselves stymied in their attempts to craft a policy of diplomatic suasion (that is, convincing others to do, or not to do, something). Having coercive military strategy as a potential bargaining tool will effectively increase the negotiating ability of policy makers.

Cimbala did not set out to draft a guidebook for negotiation. What he does is present the idea of coercive military strategy and place it in its ap-

propriate historical context. He examines the spectrum from the cold war and the Cuban missile crisis to Operation Desert Storm and collective security operations. In each example, he looks at how coercive military strategy was—or was not—used. During his discussion of the Vietnam War—a time during which, according to many commentators, coercive military strategy was used but failed—he argues convincingly to the contrary. In his conclusion to this chapter, he states that coercive strategy could have been successful had the United States been willing to use more decisive means to pursue its goals. Because it did not do so, coercive military strategy did not have the backing of the people in power, which would have made it an effective tool.

A willingness to use military coercion is central to Cimbala's theme, and the logical way he sets out to present military coercion as a strategy is noteworthy. Starting with the cold war and ending with the current trend towards collective security, Cimbala presents coercive military strategy in its earliest form (when the idea was better known as "coercive diplomacy") and then develops it, looking at different conflicts and ways the strategy has been applied in each. In his chapter on Desert Storm, he asserts that "the Gulf crisis and war in 1990–91 may seem an inappropriate venue for demonstrating the military relevancy of coercive strategy" (69). However, he goes on to show that it is in fact appropriate within the context of political and military constraints. Because the United States was successful, coercive military strategy, rather than being inapplicable to this example, was actually the linchpin for the coalition's success.

Although Cimbala's work is balanced, well developed, and convincing, it is not without flaws. Most significantly, he seems to have difficulty tying the concept of coercive military strategy into MOOTW. His chapter on this subject contains good information about concerns the United States will face when confronted with the need to conduct these other operations; unfortunately, he does not convincingly introduce the usefulness of coercive military strategy. This is not because it is not useful, since having a credible threat backed up by the willingness to follow through has the potential to be an effective deterrent. The problem is that Cimbala neither effectively establishes a connection nor provides solid historical examples to show how coercive strategy has worked in MOOTW. This weakness, however, does not significantly detract from the overall impact of the book.

Saying that Cimballa breaks revolutionary new ground with *Coercive Military Strategy* would be going too far because that is not what he intended to do with this book. Rather, he examines historical examples of the employment of coercive military strategy in an attempt to offer an option to policy makers in the current environment, which seems to favor collective security, peacekeeping, and peace-enforcement operations. *Coercive Military Strategy* is an important work in the field of international strategy and is a useful tool for students and policy makers alike.

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Case Studies in Strategic Bombardment edited by R. Cargill Hall. Air Force History and Museums Program, 200 McChord Street, Box 94, Bolling AFB, Washington, D.C. 20332-1111, 1998, 665 pages.

To be clear from the start, *Case Studies in Strategic Bombardment* will take its place alongside the half dozen or so other key books on the history of strategic bombardment. This might be expected since most of its authors are among the top historians in the fields of aviation and strategic bombardment. They live up to their well-earned reputations by producing seven detailed essays that are valuable not only for their masterful summaries, but also for their rich citations and broad bibliographies. Thus, they capture the current state of scholarship on strategic bombardment.

Like most collections, these essays vary in quality—which is to say they will be valuable to different people for different reasons. A few are useful for the new sources they employ; others for their fine summarization; and some for their insightful observations and conclusions. But this long, dense collection does not lend itself to easy reading. The graphics are good although the photographs are on the dark side. More critically, the index is inadequate for a book that is much more likely to be sampled or consulted than read cover to cover. Although *Case Studies in Strategic Bombardment* had a long gestation period, most of the essays indicate that the research was cut off in the early 1990s. This, however, is not a disqualifier because I firmly believe that this collection will stand the test of time.

It will do so despite the fact that there is little new here. Indeed, most of these subjects have been fairly well raked over by a number of writers, including some of the authors of these essays. The outstanding features of this collection are its scope and quality: it gives broad, overall coverage of the subject with generally excellent, balanced, well-documented summaries, all within one volume. The quality of the majority of the chapters is well above average for a collection of this sort, bringing much credit to the authors. In all candor, however, I was disappointed by the chapters that covered the cold war, Korean War, and Vietnam War, which are neither up to the high standard of the rest of the volume nor what these topics deserved—if not demanded.

The one piece that stands above the rest and that does plow some new ground is, as might be expected, on the most recent topic—the Gulf War. Although a number of items have already appeared on this subject, Richard Davis uses archival materials along with published sources not only to describe the topic, but also to present a penetrating analysis. Unlike most accounts, this treatment criticizes the campaign on a number of points. These persuasively supported criticisms may surprise some people who might (unfairly) not expect this from an official (Air Force) historian and who have read the overwhelmingly laudatory accounts of the air war that have emerged from works thus far published. The other pieces in this collection show us where we are now, but Davis's essay does more—it sets the standard for this topic and will be the jumping-off point.

The authors, editor, and Air Force History Office are to be highly commended for this excellent product. All readers interested in military history, aviation history, and particularly strategic-bombardment history are the beneficiaries of this effort. *Case Studies in Strategic Bombardment* is a job very well done.

Kenneth P. Werrell
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Vipers in the Storm: Diary of a Gulf War Fighter Pilot by Keith Rosenkranz. McGraw-Hill, 1221 Avenue of the Americas, New York, New York 10020, 1999, 325 pages, \$24.95.

I approached this book with a good deal of anticipation because I share something with Keith Rosenkranz. We both found the defining moments

of our professional careers in the 388th Tactical Fighter Wing. But the commonality ends about there. I had been a squadron commander of an AC-130 unit in the 388th overseas two generations before he returned from Korea to join it as an F-16 "Viper" pilot at Hill AFB, Utah. He had been back with his young family for only six weeks when the 388th deployed to the Middle East for the Gulf War. His defining moment was flying combat in that conflict.

Keith Rosenkranz lends some substance to Carl Builder's assertion that Air Force people are in love with their toys—fascinated by flying but not much interested in war. That was just his initial motivation, however. He was brought up in sight of the great airports in southern California and from the earliest times envisioned himself as a flyer—but a flyer of the great jet airliners. Educated at Loyola Marymount University, he entered the Air Force in the early 1980s intent on becoming a KC-10 pilot in anticipation of a career in commercial aviation. He was temporarily diverted to being an instructor in the T-38, still intending to enter the world of heavy jets later on. But along the way, his colleagues sold him on going into fighters, and he wound up in F-16s in Korea. He married a lady, also from southern California, and they had twin girls before he left. Rosenkranz's book is very well written, but his acquisition of writing skills is not apparent. He acknowledges important help in the editing, which also is well done. My only complaint is that the penuriousness of the publisher resulted in such small type that the eyes of this ancient aviator were sorely challenged.

Vipers in the Storm yields a microview—a cockpit view of the war. I do believe that such a view is most valuable because the market is awash with studies focused at the strategic and grand-strategic levels. Too, a cynic might sometimes think that the ingenuity of crew dogs like Rosenkranz and his colleagues sometimes rescues an operation otherwise doomed to disaster by an inept strategy. However, the victorious strategists most often write the history, assuming that victory could arise only from a sound plan rather than from pure good fortune or the like. So the view from the trenches of air war is a useful one, and the author does not seem to have any particular reverence for leadership. The greater part of it he sees as good, but he is not very reluctant to voice a contrary opinion.

Vipers in the Storm was interesting reading to me. However, it does go through the war experience, mission by mission, in great detail for every sortie, and some readers may grow weary of this.

Rosenkranz also gives more of the personal side of air war and deals quickly with more of the sentimental and ideological things than is often the case in war stories. Probably that is worthwhile reading for Air Force leaders because it would help explain how an officer whose defining experience is flying fighters could nonetheless leave the Air Force for the dreary world of airline flying. Even in the absence of the alluring airline salaries, the operations tempo in the flying units has become so intense that it has to be a major negative factor. Certainly it was for this diarist.

There is a sea of Gulf War literature that could dominate the air warrior's/scholar's professional studies to the exclusion of everything else. *Vipers in the Storm* has the misfortune of appearing simultaneously with at least two other books that would take a higher place on your reading list. The first is Tom Clancy and Gen Charles Horner's *Every Man a Tiger*, and the other is Edward J. Marolda and Robert J. Schneller's *Shield and Sword: The United States Navy and the Persian Gulf War*. But if you can find the time, Rosenkranz's book is highly readable and technically accurate, yielding a worthy view of life in the trenches of a modern wing not too different from the envisioned Air Expeditionary Force.

Dr. David R. Mets
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Lichfield: The U.S. Army on Trial by Jack Gieck.
University of Akron Press, 374-B Bierce Library,
Akron, Ohio 44325-1703, 1997, 277 pages,
\$39.95.

On 1 December 1945, the US Army convened a general court-martial in London to inquire into allegations of brutality and murder. These atrocities had been committed, not by black-uniformed Nazis in the hellish concentration camps of the Third Reich, but by American officers and enlisted personnel—and not upon our erstwhile enemies but upon other Americans at the 10th Replacement Depot near Lichfield, England. At the end of the war, the commandant, Col James Killan, and the guards of the depot were accused of running a "concentration camp for American soldiers." For a while the story simply smoldered on the back pages of *Stars and Stripes*, overshadowed by the trials of Nazi war criminals then going on in Nuremberg. But on 5 December 1945, the story hit the

front pages with the announcement that nine guards would be tried on charges of "cruel and inhuman disciplinary treatment of stockade prisoners during the winter of 1944-45." This trial became only the first in a succession of trials—the initial emergence of a blossoming scandal that the press on both sides of the Atlantic would term the "Lichfield trials."

When the author, at the time stationed in Germany, arrived in London on leave, determined to attend at least some of the trial, he didn't realize that this would be the start of a 40-year project to record the events. Chronicling a series of courts-martial through extensive interviews and transcripts, *Lichfield* starkly documents beatings, shootings, and, above all, the clash between Colonel Killan and the assistant trial judge advocate, Capt Earl J. Carroll of the Army Air Corps. This clash of personalities turned into a clash of adversaries, with witnesses returning to the stand to confess to perjury and the colonel attempting to create a mistrial, suborn perjury, or excuse his behavior because he was "just following orders." Coming at the same time Nazi war criminals were being tried and sentenced to death at Nuremberg, this excuse echoed hollowly in the newspaper accounts of the day. Throughout, the author quotes transcripts of the proceedings—including blatant perjury, some of it later recanted—that coalesce into a frankly chilling picture that made this reader wonder if, in those days, the term *military justice* were really an oxymoron.

More than simply a chronicle of a trial, *Lichfield* clearly shows why the military justice system was revised after World War II. The author avers that the trials really resulted in the reformation of the military justice system's *Reader's Digest*-sized 1928 edition of the *Manual for Courts-Martial* (in which only eight pages of the Articles of War constituted the law) to the *Uniform Code of Military Justice*, revised annually. This reformation included all those things that today's military personnel take for granted, including something the defendants at Lichfield did not enjoy—a military defendant's right to a jury of his or her peers, a third of whom can be enlisted personnel if the defendant is an enlisted person.

In an oblique fashion, through the actions of the commandant and the guards, the author also explores the corollary of the Nazi defense at Nuremberg: a soldier's right—indeed, his or her obligation—to refuse to obey an unlawful order. In short, *Lichfield* is a fascinating read—a remarkable story of a little-known incident in the closing chap-

ters of World War II. It is compelling not only for attorneys or someone interested in trials, but also for every military person interested in the military justice system at work.

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Millbrook, Alabama

Fortress America: The American Military and the Consequences of Peace by William Greider. Public Affairs, 250 West 57th Street, Suite 1825, New York, New York 10107, 1998, 208 pages, \$22.00.

How to Be a Cheap Hawk: The 1999 and 2000 Defense Budgets by Michael O'Hanlon. Brookings Institution Press, 1775 Massachusetts Avenue NW, Washington, D.C. 20036, 1998, 178 pages, \$16.95.

Both *Fortress America* and *How to Be a Cheap Hawk* are written against the background of the Balanced Budget Amendment's call for 10 percent defense cuts and the Quadrennial Defense Review's (QDR) recommendation of only half that amount in personnel and weapons-systems cuts. To further complicate this already delicate situation, the Department of Defense (DOD) is coming out of a procurement holiday and soon will have to replace aging equipment with new. Both books argue that the force structure of the US military is still geared towards the cold war and thus is not able to deal with technological challenges. Further, they consider the two-Desert Storm scenario planning outdated and even decry the Pentagon strategy of "win and hold" as unnecessary.

Greider argues that assumptions about force requirements are based on the cold war and thus out of date. He sees little danger to the United States in the next 10 years; for that reason, threat predictions are all based on defense contractors' needs for dollars and orders for new equipment. He reveals inefficiencies in DOD and claims that arms manufacturers recovering from their consolidations are wasting millions of taxpayer dollars. In discussing the "Iron Triangle"—DOD, Congress, and defense contractors—he reveals that the military realizes that defense contractors are overcharging and not keeping the technology promises they make. This breakup of the triangle could lead to new power constellations in Washington.

He also blasts the Pentagon, claiming that it has left intact government-owned factories that have no work to do. Among the numerous examples he cites is the fact that the F-22 is being built in two factories instead of one.

Not only has it been politics as usual in Washington, but there has been no far-reaching or new strategic debate, which serves to maintain the status quo in national defense. Sen. John McCain (R-Ariz.), quoted as a defense reformer, argues that without a national debate as to what our strategic interests are or should be, the DOD budget continues without any change. McCain also points out that while certain parts of DOD need money for their mission, no one in the administration has figured out where those areas are. Thus, procurement continues, in spite of competing claims among the services. As vertical integration of the defense industry took place, the big names also acquired second-tier supplies until, in view of a shrinking asset base and in order to maintain some competition, DOD finally said "no" to the Lockheed-Martin/Northrop-Grumman merger.

Greider's theme is that our existing military structure is too large to maintain, too backward looking in design, and too ambitious in its preparation for future war. Greider himself admits that he offers no solutions, hoping instead to ignite a debate about US defense-spending priorities. He is certain that budget surpluses will soon disappear when the economy has a downturn and that defense procurement will be cut as funds for public spending dry up. Greider may be on target with that prediction.

In *How to Be a Cheap Hawk*, Michael O'Hanlon argues that in order to maintain a defense posture, we need to find savings in the defense budget. Although most people will argue that his quest for savings has led to an underappreciation of defense requirements, his book does offer proposals that may need to become part of a larger defense-policy debate. Using the QDR as a starting point, O'Hanlon calculates that the DOD budget will be short \$20 billion in 2002 and \$10 billion in 2003. In order to achieve savings, he proposes cutting or terminating funding for the F-22, F-18 Super Hornet, Comanche, and V-22 Osprey programs; the DDG-51 and Trident D-5 programs also would be affected. Further, he calls for modifying the two-Desert Storm scenario planning to one-Desert Storm planning plus a Bosnia-like contingency, changing routine forward naval operations by rotating crews by plane (reducing the number

of sailings), and reducing the nuclear arsenal to thirty-five hundred warheads.

Designed as a blueprint for staying within the budget restrictions imposed by Congress, O'Hanlon's book makes far-reaching proposals but ignores the fact that in this post-cold-war era, the military is deployed more and the usefulness of current weapons systems is rapidly slipping. Although O'Hanlon admits that readiness is declining and that pay and other benefits need to be raised, he doubts that such a thing as a revolution in military affairs really exists or is emerging. He also examines forward basing (e.g., marines in Okinawa), sea lift, and pre-positioned ships for supporting various contingencies.

Both books provide a look at how the military and its budget are perceived, especially in light of upcoming defense and budget debates. However, neither book devotes adequate space to a discussion of how the United States is to meet various threats or develop strategic goals. Both authors have a globalist view of the world but seem unable to grasp the fact that one can conduct global intervention only with military forces. The fiscal arguments of the books are sound, but shortfalls in weapons procurement do not show the entire picture. The lack of personnel to run this military machinery is a growing problem—one that money alone cannot address. Greider's prediction that the Iron Triangle on Capitol Hill may soon be broken could lead to some interesting developments. Both books represent current views on the ongoing defense debates, but with the president's announcement of more money for DOD, some of their arguments will disappear into the policy debates of Washington, D.C.

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Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940–1943 edited by Daniel R. Mortensen. Air University Press, 170 West Selfridge Street, Maxwell AFB, Alabama 36112-6610, 1998, 207 pages.

And men afterward will study our arms in museums and nod their heads, and frown, and name the inadequate dates and stumble with infant tongues over the strange place-names.

—Edwin Rolfe

Eminent scholar John Keegan notes that many official histories of the desert campaigns of World War II do not match the quality displayed by studies in other areas of that war (*The Battle for History: Refighting World War II*, 69–70). Hence, Mortensen's compilation is welcomed, providing the reader a close look at the formative years of Allied air and ground force cooperation in North-west Africa during World War II.

In the first essay, Vincent Orange proves too anecdotal for this reviewer (but not quite as oddly as Richard Bickers's *The Desert Air War, 1939–1945*). Nevertheless, Orange emerges on solid ground through a valuable overview of the development of joint army-air directives, combined British-American principles of airpower, comparison of Allied air efforts with those of the Afrika Korps, and the pivotal role of logistics.

Reexamining primary and secondary sources, David R. Mets takes to task the long-held notion that American airmen in North Africa were ignorant in doctrine and leadership until shown the proper course by their compatriots in the Royal Air Force (RAF). The truth is that many ideas culminating in Britain were incipient in the American intellectual forge of prewar airpower theory. One of the most important of these ideas was the need for centralized control over theater airpower assets, a lesson learned hard at Kasserine Pass, where piecemeal commitment of airpower and lack of air-ground coordination resulted in high Allied casualties with unsatisfactory effects against enemy forces (viii). Fortunately, Mets's wide-ranging essay goes beyond the role of airpower to include the contributions of artillery, airfield preparation, logistics, weather, and lines of communications.

Meanwhile, Daniel R. Mortensen reexamines the role played by Brig Gen Lawrence S. Kuter, based in Washington, D.C., in formulating the role of air units supporting ground forces, as particularly reflected in the publication of doctrine. Although doctrine often "worked better in Washington . . . than it worked in the theater" (138), airpower thinkers in Washington usually respected the war fighter's need for *flexibility* rather than *priority*. Simply put, superiors cannot nullify the perception and experience of combatants by ignoring war's paradoxical logic. Fortunately, Kuter had an ally in Gen Dwight Eisenhower, who knew the benefits of centralized command and stuck to that conviction even though his generals preferred to parcel out airpower. Furthermore, Kuter cataloged how airpower was misapplied due to poor application of capabilities, resulting in failures early in the

North Africa campaign. The RAF also endorsed many of his constructive criticisms. Yet, expanding the influence of air commanders went beyond Kuter, for it was Brig Gen Orvil Anderson who helped ensure that the air commander's prerogatives were not ignored in the overall campaign.

Continuing in this vein is David Spires's article on the high level of air-ground cooperation achieved between Lt Gen George Patton and Maj Gen Otto Weyland in Northern Europe. In the end, Weyland ensured that he had the resources to meet Patton's objectives while his overall theme "remained air-ground cooperation and the importance of preserving it for the future" (159).

This excellent book has few flaws. Operational-area maps should have been included, and cameos of general officers could have been set on two pages. Photographs showing the *effects* of their leadership at the bloody end of the spear would have been apropos. Today, we live the doctrinal legacy of these great American and British airmen, whose dearly bought concepts emerged from the crucible against an enemy whose extraordinary achievements had been equaled only by Attila's Huns and the hordes of Genghis Khan. As such, rather than showing Weyland at his "fancy desk" (156), the editor could have included a photo from the North Africa Cemetery in Tunisia, where today sixty-five hundred Americans are eternally commemorated.

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Beyond Horizons: A Half Century of Air Force Space Leadership by David N. Spires. Air Force Space Command in association with Air University Press, 170 West Selfridge Street, Maxwell AFB, Alabama 36112-6610, 1998, 383 pages, \$25.00.

For the third time since 1988, the Air Force is attempting to integrate space into Air Force operations. Why is space integration important, and why has it defied two earlier integration programs? In *Beyond Horizons*, David N. Spires traces the history of military space activity in the Air Force from conceptual studies in 1946 until the conclusion of Operation Desert Storm in 1991. This fascinating history of the United States Air Force in space provides insights into understanding these questions.

Dr. Spires, a professor of history at the University of Colorado at Boulder, is a former Air Force officer who taught history while stationed at the

United States Air Force Academy. He authored this book, as well as a number of other books on Air Force history, under contract to the Office of Air Force History.

The pursuit of space capabilities faced two challenges. The first was developing a booster to lift a useful payload into orbit, and the second was building a payload that could operate under ground control, survive the harsh environment of space, and last long enough to provide militarily useful service. In the 1950s, the race to develop the intercontinental ballistic missile simultaneously provided space boosters. Gen Bernard A. Schriever dedicated the majority of his career to pushing the Air Force into the space age, but he left a legacy of space research and development that stubbornly resisted the transition of successful space capabilities into the operational Air Force.

From the launch of sputnik in October 1957 until the collapse of the Soviet Union in 1991, possibly the greatest threat to the peace and security of the United States was a nuclear attack against the American homeland. Much of the *raison d'être* of the military space effort was deciphering Soviet intentions, assessing their capabilities, warning the national leadership of attack, and maintaining command and control of retaliatory forces in the event of a nuclear confrontation. Weather satellites provided data to plan strategic nuclear strikes. Geosynchronous, infrared detection satellites maintained constant vigilance over the Soviet Union for missile launches. Communications satellites allowed the National Command Authorities to direct worldwide nuclear forces. The most famous capability was the recently declassified Weapon System 117L/CORONA imaging satellite that gave the United States an effective means of peering behind the Iron Curtain. Operation Desert Storm dragged these capabilities out of their highly classified, cold war strategic missions into widespread theater operations.

The struggle to overcome physical and technological barriers and the preeminence of the nuclear mission both conspired to impede the integration of space capabilities into mainstream military operations—even in the Air Force, although it was the principal owner and operator of the systems. The establishment of Air Force Space Command in 1982 was the first major step toward “normalizing” space operations. In 1988 and 1992, the service chiefs of staff commissioned blue-ribbon panels chaired by general officers to develop plans for integrating space into Air Force operations. Presumably, neither of these efforts was com-

pletely successful because the chief of staff commissioned a task force in 1998 to develop yet another plan to integrate air and space. Perhaps this third attempt can overcome the impediments that foiled the previous two.

Spires succeeds in writing a compact yet comprehensive history of the Air Force in space. *Beyond Horizons* is thoroughly supported by books, studies, reports, and interviews. It is an excellent policy primer on Air Force space operations without wallowing in technical details. This timely book is not a page-turner, but neither is it dull or tedious reading. It should be mandatory reading for everyone involved in air and space integration efforts and for any professional who recognizes the future role of space in military operations.

Maj Mark P. Jelonek, USAF
Pentagon, Washington, D.C.

Into the Tiger's Jaw: America's First Black Marine Aviator: The Autobiography of Lt. Gen. Frank E. Petersen by Frank E. Petersen with J. Alfred Phelps. Presidio Press, 505-B San Marin Drive, Suite 300, Novato, California 94945-1340, 1998, 334 pages, \$24.95 (cloth).

Frank Petersen could have been a Navy steward. That's what his recruiter wanted him to be after a retest proved that his high test score did not result from cheating. That episode seems to encapsulate the world in which Petersen made his career. In 1950 a black seaman customarily became a steward. The racist assumption was that blacks had limited capability and potential. Petersen refused to accept a second-class fate, demanding electronics school instead. Even in electronics, he might have remained obscure. But when he heard that the Navy's first black aviator had died, he was determined to become a pilot. With that decision, he began to write a story of struggle against the odds—struggle that culminated in his becoming the Marine Corps's first black aviator, first black colonel, and first black general. In his 38-year career, more than one pivotal event could have thrown Petersen back into obscurity worse than that of a successful if insignificant steward's or technician's career. He had more than one opportunity for inglorious failure. After all, he was not the first black marine to try—he was the first to succeed. Petersen's career encompassed two wars and a civil rights revolution—and he was heavily involved in each.

Alfred Phelps is no beginner, having previously authored a biography of Air Force general Daniel James and a study of blacks in the American space program. His experience shows in this excellent work. Too often, memoirs and autobiographies seem to be written in the third person. What should be a highly personal story oftentimes is a self-censored, self-serving half-truth written in awareness that history lurks just beyond the written word. Phelps and Petersen reveal the bad along with the good and make the general a human being. Especially effective is the use of "mutual voices"—the words of colleagues and family emerging at appropriate places to balance, sometimes contradict, the narrative. This use of multiple perspectives on the same event reinforces the authors' effort to reveal the Petersen who might otherwise have fallen into self-censorship.

This work provides lessons about how a successful career depends on many things. Petersen had them all—opportunity, persistence, hard work, sacrifice, and luck. He made the most of his opportunities, persisting in the face of racism and near failure. He worked hard and sacrificed—even his marriage. And he had luck—fortuitous timing as it were—when someone else who might have been first fell by the wayside. Petersen also made sure that he filled in all the blanks—schools, jobs, and sponsors—appropriate to each stage of his career. There is no starry-eyed idealist in this story—just a hard-headed, hard-driven realist. This story is worth telling and worth heeding.

Dr. John H. Barnhill
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The Strategic Air War against Germany, 1939–1945: The Official Report of the British Bombing Survey Unit with an introduction by Sebastian Cox. Frank Cass, Newbury House, 900 Eastern Avenue, Ilford, Essex, England IG27HH, 1998, 171 pages, \$59.50.

The debate over the effectiveness of strategic bombing against Germany has raged for over five decades. The argument is often polarizing: one side claims that the bomber offensive was decisive and if pursued sooner or with more vigor, German defeat could have occurred earlier and at less cost. Others claim that the strategic air war was not only an inefficient use of resources but also was incidental to Allied victory: Germany was defeated the old-fashioned way—overrun by ground forces. Too

often this argument is composed of much heat but little light. Speculation, opinion, and hypothesis abound, with distressingly little empirical evidence to support any conclusions. This was not supposed to be the case. Both the United States and Britain intended to quickly gather as much information as possible regarding the effectiveness of the strategic bombing campaign. In the United States, this resulted in the authoritative US Strategic Bombing Survey (USSBS), authorized by President Franklin Roosevelt, that produced 208 volumes of charts, tables, and analysis. Unfortunately, the USSBS has been out of print for decades, with the exception of a short but quotable summary volume that gives general conclusions but no detailed evidence. The situation has been worse in Britain.

The Royal Air Force (RAF) proposed a study in May 1944 to examine the effects of its bombing campaign against Germany. For a variety of reasons, however, the resulting study was neither as timely nor as thorough as the RAF would have liked. Whereas the USSBS employed over a thousand analysts who began their work in November 1944, the British Bombing Survey Unit (BBSU) employed only a few dozen individuals, and they did not begin collecting data on the Continent until after the war ended in May 1945. Nonetheless, the BBSU did a commendable job of analyzing the effects of Allied bombing on German industry, military forces, and morale. Unfortunately, their report was immediately classified and not available to most scholars. That has finally changed with this volume, which includes an outstanding introduction by Sebastian Cox, the head of Britain's Air Historical Branch. Cox is starkly objective in his assessment of the BBSU *Report*, pointing out its flaws and biases, while also noting its important insights. Overall, the *Report* paints a detailed and favorable assessment of the bombing campaign. Replete with dozens of graphs and tables, it documents the collapse of the German economy under the weight of the bombing offensive. Absenteeism among factory workers due to the bombing exceeded 25 percent in some areas, and oil, steel, chemicals, explosives, rubber, and fertilizer production plummeted once the bombing campaign began in earnest in the summer of 1944. (Due to the slow buildup of Allied air forces and their use in operations in North Africa, Sicily, Italy, and the Battle of the Atlantic as well as preparations for Overlord, the actual tonnage dropped on Germany was relatively slight for much of the war: 72 percent of all bombs dropped on Germany fell after D day.) The *Report* also

notes that these production drops were not caused by Allied armies overrunning Germany and occupying factory districts. The Allies did not enter Germany until late February 1945, and by then the economy had already been destroyed from the air. Of import, the bombing campaign utilized only 7 percent of the total British war effort to achieve these gains, whereas the British army absorbed eight times the resources while also incurring heavier casualties.

Paradoxically, one of the *Report's* strengths is also one of its biggest flaws. During the war, people hotly debated whether the key target for the bombing offensive should be oil or the German transportation network—specifically, railroad marshaling yards. The debate tended to break along national lines: American airmen argued for oil, while most RAF leaders pushed for transportation. The British position won out, but the fight between the Allies was messy. The *Report* summarizes this debate well but unabashedly backs the RAF position. Cox notes that this should not be surprising because the *Report's* conclusions were written by the same man who during the war had most aggressively argued in favor of transportation as the key target! In addition, the *Report* barely mentions the morality of the bombing campaign—a highly contentious issue over the past half century.

The *Report* is an important book that brings valuable data to the scholar and student for the first time. Although it has a strong bias regarding targeting decisions, the statistics speak for themselves. The USSBS summary volume concluded five decades ago that the strategic bombing campaign was “decisive” in the war against Germany. The BBSU *Report* reaches a similar conclusion and presents a wealth of data to back it up. This is an essential volume for anyone studying the bomber offensive against Germany.

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Segregated Skies: All-Black Combat Squadrons of World War II by Stanley Sandler. Smithsonian Institution Press, 470 L'Enfant Plaza, Suite 7100, Washington, D.C. 20560, 1992, 217 pages, \$15.95 (softcover).

Take a short walk back in time, about 60 years, and you will find a markedly different world.

There is no hyperbole in the statement that “blacks in pre-World War II America still lived with the terrible knowledge that they might be the only people left in the civilized world who ran some risk of being burned at the stake” (xi). At that time, the military services and the United States accepted without doubt or reservation the incapacity of African-Americans to perform more than menial tasks and the insufficiency of African-American courage. You feel uncomfortable in pre-World War II America—until you recall that black Americans faced the same situation in each of America's wars and performed nobly, frequently with distinction.

Segregated Skies retells the story of how African-Americans fought to participate in the defense of their country. Published in hardcover in 1992 and released in paperback in the golden-anniversary year of military desegregation, *Segregated Skies* presents clearly the struggles of African-Americans to participate in America's air war. Racism and racial violence existed in the years between the world wars. Opportunity was limited for blacks in American society, particularly in aviation. A desultory “stepping out smartly” characterized Army aviation's implementation of a separate-but-equal air force. Individuals, black and white, played key roles in bringing about the opportunity.

African-American aviators trained in a fishbowl while coping with unequal facilities and the inefficiencies of imposing segregation in all aspects of the experience. When black aviators received better things than did white units, generally it was to preclude claims of discrimination or unfair treatment. Initially, the only base for training of the full range of black skills, from pilot to ground crew, was Tuskegee, Alabama, which quickly proved too small. When black classes moved to white bases, white commanders often ignored or worked around requirements for equal access to clubs and other facilities.

Structuring fighting units by race produced skills imbalances, delayed or denied promotion opportunity, led to demoralization, and on rare occasions fomented unrest and violence. The segregated air force was inefficient and wasteful.

The black units, four fighter squadrons and a medium bomber group, finally joined the war effort, and some fought alongside white squadrons. As with white units, African-American performance varied from unit to unit, and unit performance fluctuated over time. Despite ample evidence to the contrary, when the experiment ended, the armed forces remained for the most

part unconvinced that blacks should continue in the American military. Report after report documented preconceived racial notions. Only the rare exception evaluated the evidence and reached an evidence-based conclusion. It took a politician to overturn the biases of the services, as it had taken a politician to introduce the opportunity to fight this war in the air.

The book is extremely well documented with a good mix of primary and secondary resources. Its illustrations help greatly. *Segregated Skies* is an indispensable part of any airman's library. The book's only significant shortcoming is the absence of an updated bibliography; perhaps the next edition will include one. The Smithsonian should be commended for its efforts to make available a wide range of military histories in clean, attractive, and affordable format.

Dr. John H. Barnhill
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On-Site Inspection in Theory and Practice: A Primer on Modern Arms Control Regimes by George L. Rueckert. Praeger Publishers, 88 Post Road West, P. O. Box 5007, Westport, Connecticut 06881-5007, 1998, 275 pages, \$74.00.

With this book, George Rueckert has written a definitive text on the on-site inspection (OSI) process as part of modern arms control regimes. The key to understanding and appreciating Rueckert's work lies in focusing on his organization and attention to detail. He states in the introduction that he is striving to "simplify understanding of the modern on-site regimes by taking a broader, more generic look at their construction and operation" (4).

The book consists of four parts: "The Evolution of On-Site Inspection" (two chapters); "Fundamentals of On-Site Inspection Regimes" (two chapters); "Types of On-Site Inspection" (four chapters); and "Implementing On-Site Inspection" (four chapters). Additionally, the book contains two valuable appendices: "Implementation and Compliance Bodies for the Major Arms Control Agreements" and "Basics of the Treaties and Agreements." Rueckert organizes his chapters to give the reader a broad overview of on-site inspections, followed by a discussion of the basics of how the process works. The majority of his book then focuses on the details of the different types of regimes before concluding with a discussion of the OSI implementation process. The appendices en-

hance the primary text and provide a quick-reference tool for future use. This organization is one of the book's strengths.

Rueckert spent 27 years in the State Department working on national security and arms control issues as a Foreign Service officer. Upon implementation of the Intermediate-Range Nuclear Forces (INF) Treaty, he served as the first principal deputy director of the newly established On-Site Inspection Agency (OSIA). After retiring from the government, Dr. Rueckert became a senior manager and program director for DynMeridian, a major arms control issues contractor. This extensive background in the field of arms control and on-site inspection certainly makes him qualified to write this book. In addition to his professional experience, Rueckert draws from a previous book he authored, *Global Double Zero: The INF Treaty from Its Origins to Implementation* (Greenwood Press, 1993). This cross-referencing adds to the depth of his current book and indicates the extent to which Rueckert researched this subject. Attention to detail is another of the book's major strengths. Rueckert does not try to cover all arms control agreements and OSI regimes; instead, he focuses on those agreements that contain OSI provisions, concentrating particularly on those concluded after 1980 (since arms control agreements prior to that date rarely contained comprehensive OSI provisions).

One finds this attention to detail in chapter eight, in which he discusses on-site monitoring regimes. This type of regime, explains Rueckert, differs from other on-site inspections because it involves the continuous presence of the monitoring team or equipment at a "specific location on the soil of the inspected party" (135). He devotes 25 pages to this particular subject, demonstrating a thorough, in-depth knowledge.

He goes on to provide a detailed discussion of the role of national military structures in chapter nine, devoting a good deal of attention to the role of the Department of Defense as well as OSIA. Chapter 10 discusses the roles and responsibilities of civilian agencies such as the Arms Control and Disarmament Agency and the Department of Energy. He mentions the formation of the Threat Reduction and Treaty Compliance Agency only once, which is curious because this is the federal agency that recently absorbed OSIA.

This attention to detail, though, is somewhat distracting because Rueckert seems to have included more information than one needs in a primer. In chapter 10, for example, the author goes on to say that on-site monitoring regimes are

rarely used, specifically because they are so complicated and involved. Why, then, devote 25 pages to the subject?

Another weakness relates to the author's inherent biases, although one might say this is true of almost any author. An introductory chapter outlining the specific premises and assumptions on which Rueckert based his work would have been useful. Without such a chapter, the reader will not delve too deeply and consequently accepts the author's assumptions and biases as fact. Highlighting this issue is Rueckert's discussion at the beginning of chapter two, "Development of the Modern OSI Regime." Rueckert states that "the insistence on OSI also served useful domestic political purposes [because it] helped to undercut demands for nuclear freeze in the early 1980s and to gain support for military modernization" (24). Although this is likely a true statement, Rueckert presents it as unassailable fact without adequately supporting it.

Another example of this bias is that in several chapters, Rueckert uses very few references, often quoting his own book on the INF Treaty. In chapter two, for example, he offers 10 footnotes: one from his previous book, one from a State Department document (which he may well have played a role in generating), six for clarification of text, and only two from outside sources. Similarly, he includes very useful charts in his chapters, but in at least two places (chapters three and seven) he uses tables from DynMeridian, his former employer.

Rueckert also tends to use sweeping generalizations. In chapter two, he states that the INF Treaty "marked the true watershed in the acceptance of on-site inspection as a fundamental . . . of modern arms control verification regimes" (25). Implicit in this statement is a dismissal of other possible reasons for the acceptance of on-site inspections; at the very least, it discards or ignores other possibilities without even evaluating them. Again, this is not to say that his statement is not true; it merely serves to illustrate that Rueckert makes his statement without providing any support beyond his expertise in the field.

Rueckert conveys his belief that OSI is the preeminent element of all arms control agreements, going almost so far as to claim that without OSI, any agreement is doomed to failure. At the end of the last chapter, Rueckert states that "[on] balance, it is clear that OSIs make a substantial contribution to national security by enhancing verification, complicating the process of cheating, assisting confidence building, and offering a further mech-

anism for confirming the political and military intentions of possible adversaries" (238). Although he does go on to qualify this statement by saying that OSIs are not infallible, the previous statement is a clear indication of his true feelings on the subject.

Rueckert's book is a well-researched, well-written examination of the elements of on-site inspection as part of arms control agreements. Although his State Department background might tempt some readers to take the contents of his work at face value, without examining it closely for any underlying assumptions, he does not offer himself as *the expert* in this field. *On-Site Inspection in Theory and Practice* will work well for anyone interested in the study of international relations and national security; it will also serve as a useful reference for professionals in the field. In both cases, however, the reader must understand where the author is coming from and what his biases are.

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March Air Reserve Base, California

Just What War Is: The Civil War Writings of DeForest and Bierce by Michael W. Schaefer. The University of Tennessee Press, Knoxville, Tennessee 37996-0325, 1997, 172 pages, \$36.00.

Michael Schaefer's *Just What War Is* has as its thesis that of all the literature produced by veterans of the American Civil War, only the corpus produced by Ambrose Bierce and John William DeForest successfully portrays the complexities of the way war really is, producing "a more accurately descriptive . . . realistic form of combat discourse" (xiv). For DeForest, accurate depictions of combat hold didactic value, preparing "the neophyte soldier for what he will encounter in combat" (67). Specifically, in Bierce, Schaefer finds a body of literature that "for the first time in American literary history does not to the slightest extent gloss over the physical and psychological terrors of battle" (130).

Paradigmatic of Bierce was his experience at Shiloh, "a nightmare of ignorance, irrationality, and horror to which the only possible response is subjective, leading inevitably to the alienation and isolation he evinces in his response to the wounded" (78). Indeed, the horrors of combat could be called Bierce's leitmotiv, leading him to tender no cosmological purpose to war. In contrast, DeForest concerns himself with how a grasp

of history and a concentration on the tactical mission aid the soldier in overcoming fear, resulting in a productive combatant. In the interest of historiography, both authors rail against specious representations of warfare, particularly the expedient "official histories" that bolster the social order. As such, Ulysses Grant was often cast by journalists into as much a "marble man" as Robert E. Lee was by hagiographers of the Lost Cause. Tellingly, in his memoirs, William Tecumseh Sherman ignored the slaughter of hundreds of federal troops at Pickett's Mill. Similarly, DeForest reminds us of Philip Sheridan's demoralized retreat before Confederate forces at Cedar Creek as an event receiving short shrift in the history books.

In the end, both "arrive at essentially the same stance in response to war," with "the dialogic combination of the two voices tell[ing] us more about the paradoxes of combat than either one can do alone" (135). Hence, military professionals interested in a detailed study of men in combat will thoroughly enjoy *Just What War Is*. Schaefer's is an intellectual undertaking, requiring attentive reading. Those who are simply Civil War buffs will have difficulty staying with it, since the book's eminence lies in its effort to purge "historically derived illusions regarding heroism and the gaining of personal glory" (120). It is the letting go of such illusions that will enhance the chances of survival in combat.

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Pulling Back from the Nuclear Brink: Reducing and Countering Nuclear Threats edited by Barry R. Schneider and William L. Dowdy. Frank Cass, 5804 N.E. Hassalo Street, Portland, Oregon 97213-3644, 1998, 309 pages, \$20.00.

Pulling Back from the Nuclear Brink is the product of a conference held at Maxwell AFB, Alabama, in 1996. Thus, India's and Pakistan's recent entry into the nuclear club was not considered. Some of the contributors to this book, however, do point out that in spite of the best containment and counterproliferation efforts, certain rogue states will always join the nuclear club. All contributors—among them, former secretary of defense William Perry, Ambassador Robert Gallucci, and former United Nations Special Commission (UNSCOM) inspector David Kay—point out that, despite the success stories in South Africa and South America, the quest for nuclear weapons continues and the

world must continue to be vigilant. David Kay's essay points out that a determined opponent such as Iraq can defeat national intelligence collection systems and on-site arms control inspections—the staggering amount of material found by UNSCOM is testimony enough.

William Potter critically analyzes nuclear leakage from the former Soviet Union, a topic of today's headlines. Documented cases in his chapter show a systematic attempt by Russian criminal gangs and disgruntled scientists to smuggle out enriched uranium and plutonium. Although he cannot prove direct government involvement, Potter is suspicious in two cases due to what was discovered in the West. The number of attempts gives a good clue as to how extensive the smuggling is.

US government operations to remove nuclear raw materials such as uranium from Kazakhstan have assisted in lowering the risk. Other chapters dealing with Russia reveal to the reader that dismantlement as called for in various bilateral agreements and international treaties is not progressing due to a lack of infrastructure and storage capacity as well as a deterioration of the transportation infrastructure. This, in turn, creates situations that could lead to the loss of nuclear devices or materials. Dr. Perry argues that US counterproliferation efforts must go further in ensuring that Russia disposes and safeguards its materials.

China appears to have a bureaucratic variable in its nuclear establishment, which is under pressure to generate economic and fiscal return for the investments made in nuclear devices. The US government thus finds itself dependent on a maturing process that must come from within the Communist Party of China if it is to establish a dialogue and mutual goals. Thus, the challenge is to educate and find mutual goals in preventing Chinese proliferation and to remember that the bureaucratic structure consists of individuals who do not have the best interests of China or its people as a motivator.

The book examines other proliferation efforts around the world, states that are drawing down their weapon inventories, and international structures that are being used to limit the spread of nuclear and other weapons of mass destruction. The conference focused on future flash points that have the potential of becoming nuclearized, such as Kashmir, the Middle East, and North Asia. The chapters are laid out by region and give the reader enough depth and background analysis to understand the issues at stake in each part of the world.

The final chapters focus on US policies for the coming decade, counterproliferation, and the use

of force or other means to deter and prevent the acquisition of technology necessary for weapons of mass destruction. Gen Charles Horner discusses the utility of nuclear weapons in the post-cold-war era and provides an in-depth look at how precision conventional weaponry has removed the need for nuclear weapons in targeting situations and what enemies of the United States are capable of doing to our forces with precision conventional weaponry. The American concept of expeditionary forces is threatened by the proliferation of precision-guided conventional weaponry into regions of conflict.

Pulling Back from the Nuclear Brink is a comprehensive overview of proliferation activities and efforts to limit the spread of nuclear weapons. The concise, historical studies of countries and regions give the reader enough information to understand past and present proliferation policies and also allow an understanding of national motivations behind nuclear developments around the world. Policy and action officers will find this well-written text to be a useful reference.

Capt Gilles Van Nederveen, USAF
Maxwell AFB, Alabama

Americans at War by Stephen E. Ambrose. University Press of Mississippi, 3825 Ridgewood Road, Jackson, Mississippi 39211-6492, 1997, 240 pages, \$28.00.

Professor Stephen Ambrose has had a varied and distinguished career. His works include oral histories from D day, works on small-unit actions in Europe, biographies of Dwight Eisenhower and President Richard Nixon, an award-winning history of the expedition of Meriwether Lewis and George Rogers Clark, and most recently a history of the American GI in Europe from D day to V-E day. With this work, Ambrose changed venues once again with an anthology of previously published papers. Unfortunately, this change proves to be one of the greatest problems with the book as a whole. So diverse are the chapters that sometimes the only theme threading them together is the fact that Americans are the focus. Discussed are scenes from the Civil War, World War II, North Atlantic Treaty Organization (NATO), the home front, Vietnam, and the cold war. While these chapters provide little, if anything, new to the history of leadership or war, individually, they do make for

interesting reading. Except for one egregious error, the book makes for interesting reading.

Ambrose's strength lies in his ability to tell a story through biography. In the Ulysses Grant chapter, we learn about his strategic vision. Mired in front of Vicksburg, Grant saw the end of the campaign still months away. He envisioned not every maneuver but the broad sweeps of armies, the axis of advance, and, most importantly, the ultimate objective—the capture of the vital river stronghold. Grant also understood, to use a modern phrase, the vital centers of the Confederacy. After taking Jackson, Mississippi, and putting to torch the manufacturing facilities, he abandoned the city. The enemy quickly retook Jackson, but what they gained was a shell of its former self, providing no material assets to Confederate States beyond the propaganda value that U. S. Grant had burned the entire town—which was not true.

Similarly, Ambrose profiles Dwight Eisenhower, George Patton, and Douglas MacArthur. The first chapter on Eisenhower compares and contrasts his leadership with that of Patton. These two generals couldn't have been more different—Ike, the staff officer's staff officer and Patton, the soldier's soldier (albeit with a hint of martinet). Yet, they complemented each other perfectly. Eisenhower clearly understood the ultimate objective of the war and was willing to overlook, even cover up, Patton's indiscretions (slapping two combat-fatigued soldiers as a case in point). Eisenhower understood logistics, airpower, and diplomacy. Several times during the European war, Ike saved Patton's bacon. Patton, for his part, understood the offensive, logistics be damned. He was, perhaps, this nation's greatest armor/cavalry general. Several times during the war in Europe, Patton convinced Ike to alter the strategy and be more audacious.

In a later chapter, Ambrose portrays Eisenhower's support for NATO. Again, here was a leader who understood the ultimate goal and the grand maneuvers required to achieve that goal. The author shows Ike cajoling, badgering, shaming, and begging foreign and domestic leaders to support NATO against the Soviets. He convinced Congress to support a US troop buildup in Europe. He convinced the Europeans to believe in themselves, to face the common enemy, and to rebuild their own defenses. Without Ike, it is doubt-

ful that NATO would have become the model defense organization it is today.

Ambrose is less kind to other leaders. MacArthur, although mercurial, was a brilliant strategist, isolating hundreds of thousands of Japanese in the Pacific by maneuvering around their island garrisons. Ambrose pulls few punches as he explains MacArthur's mistakes (the Bonus Marchers and 8 December 1941, and his confrontation with President Harry Truman, to name two).

The chapter on George Custer is even less flattering. Ambrose takes umbrage with other historians who portray Custer as second only to Gen Phil Sheridan as the Civil War's greatest cavalry general. Rather, the author shows that his "audacity and courage were offset by his criminal lack of good judgement" (48). The author asserts that Custer laid the foundation for the battle at Little Bighorn at Gettysburg with his recklessness and continued to build on it for the rest of the war, especially in the Wilderness. If anything, Ambrose is trying to tell military officers how not to lead.

Besides the biographical sketches, Ambrose wanders afield on topics as diverse as D day, World War II signals intelligence, the home front, and Linebacker II. Perhaps the most interesting chapter is Ambrose's brief discussion of Allied code-breaking and deception operations. In a concise and easily understood narrative, the author explains this complicated and convoluted history for the layman. He convincingly argues that without Ultra, the Allied code-breaking operation, the war would have lasted much longer and cost many more lives.

Unfortunately, there are a few minor flaws and one major flaw with this work that the reader should be aware of before spending limited resources at the local bookstore. The book contains not one map. Several of the chapters, like the one on Grant at Vicksburg, could benefit from some visual aids. Coming from the University Press of Mississippi, it is even more surprising and makes one wonder if the editor was hoping to capitalize on Ambrose's name and popularity and make a quick buck. Similarly, the author's well-deserved reputation as one of the nation's leading historians has perhaps led him into gross overstatements and hyperbole that any first-year graduate student knows to avoid. For instance, Ambrose argues that had the Allies not bypassed the Pas de Calais in the race

across France in late summer and early fall 1944, "they would still be there" (70). Hardly.

Moreover, the work needs more focus. Ambrose begins with the Civil War and ends with a speculative chapter on war in the next century. The book should include discussions of Washington's army in the Revolution and with Gen Winfield Scott's in the War of 1812 and in the Mexican War. What about our first and only war for empire at the end of the last century? What about Pershing as a strategist? Such omissions simply lend credence to the idea that the press is trying to make a quick buck.

Finally, Ambrose's chapter on the My Lai massacre is, in my opinion, fatally flawed. As mentioned, Ambrose's strength lies in his ability to translate letters, interviews, and diaries into tight, easily flowing narratives. He relishes the firsthand account, showing the war from the foxhole. Oftentimes he places the American GI on a pedestal and admires those who served. Perhaps he regrets never finding it convenient to serve in the military. Perhaps he has listened to too many veterans describe seeing their buddy try "to stuff his guts back into his stomach" (154). Consequently, Ambrose argues regarding the My Lai massacre that "the first thing we should recognize is that those of us who have never been in combat, *have no right to judge* [emphasis added]" (153). How ridiculous—so ridiculous that I had to read it three times to make certain I understood his context. If the society that the military supposedly represents does not have the right to judge murder, then who does? Of course those who have never been in combat have a right to judge. The Constitution makes this quite clear. This chapter completely mars an otherwise fine anthology.

Americans at War is not Stephen Ambrose's greatest work. However, his biographical sketches of military leaders make good, thoughtful reading. Taken individually, the chapters are entertaining, especially the biographical sketches of Custer, Ike, Patton, and MacArthur. The reader should not expect a deep intellectual work spanning this distinguished historian's career with a tidy summation at the end. Instead, read this book carefully, taking nothing at face value.

Capt Jim Gates, USAF
Los Angeles, California

“A Path to Professionalism”

Col Dale O. Condit, USAF, Retired, recommends the following readings:

- *The Age of Unreason* by Charles Handy.
- *The Art of Leadership* by S. W. Roskill.
- *The Art of War* by Sun Tzu.
- *The Challenge of Command: Reading for Military Excellence* by Roger H. Nye.
- *Excellence: Can We Be Equal and Excellent Too?* by John W. Gardner.
- *George C. Marshall: Education of a General* by Forrest C. Pogue.
- *How to Speak, How to Listen* by Mortimer J. Adler.
- *As Iron Sharpens Iron: Building Character in a Mentoring Relationship* by Howard Hendricks and William Hendricks.
- *The Killer Angels* by Michael Shaara.
- *Leadership from the Inside Out: Becoming a Leader for Life* by Kevin Cashman.
- *Leaders: The Strategies for Taking Charge* by Warren Bennis and Burt Nanus.
- *The Lessons of History* by Will Durant and Ariel Durant.
- *Makers of Modern Strategy: From Machiavelli to the Nuclear Age* by Peter Paret et al.
- *Panther in the Sky* by James Alexander Thom.
- *Please Understand Me: Character & Temperament Types* by David Keirsey and Marilyn Bates.
- *The Prince* by Niccoló Machiavelli.
- *Six Thinking Hats* by Edward de Bono.
- *Truman* by David McCullough.

Editor's Note: See this issue's "Ricochets and Replies" section for Dr. Condit's letter concerning this reading list.

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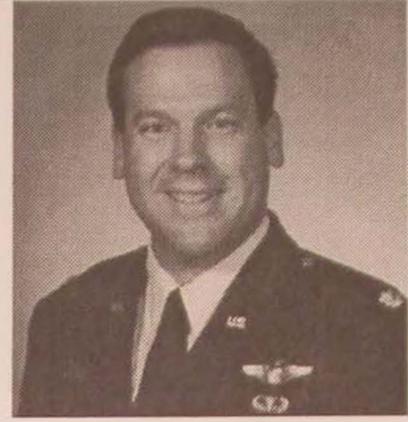
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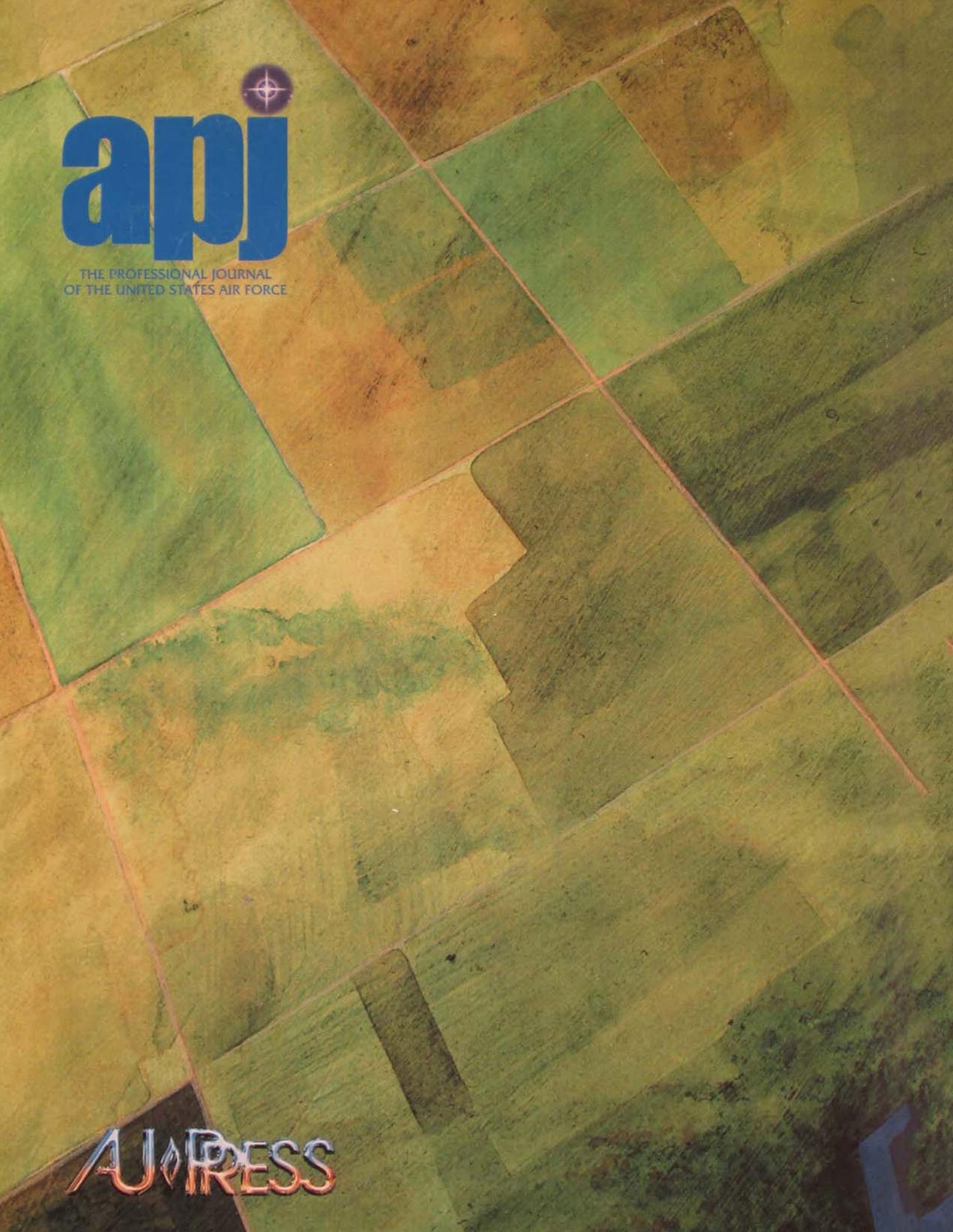


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