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The *Aerospace Power Journal*, published quarterly, is the professional flagship publication of the United States Air Force. It is designed to serve as an open forum for the presentation and stimulation of innovative thinking on military doctrine, strategy, tactics, force structure, readiness, and other matters of national defense. The views and opinions expressed or implied in the *Journal* are those of the authors and should not be construed as carrying the official sanction of the Department of Defense, the Air Force, Air Education and Training Command, Air University, or other agencies or departments of the US government.

End-State Wargaming?*

LEADING OFF THIS issue, Congressman Ike Skelton advocates studying history to better prepare for the reality of the future. Complementing this theme, Matt Caffrey provides an interesting perspective with his piece on the history of wargaming. Just as we should not limit our study of military history to certain conflicts, in the mix of wargaming and history, so should we be careful not to wargame just the wars we would prefer to fight—rather than the ones we get. Effective military leaders will be students of both military history and wargaming.

Studying military history reveals that our ability to terminate wars militarily exceeds our ability to end them politically. Interestingly, we also terminate wargames militarily better than we end them politically. The interesting mix of military history and wargaming is important to the profession of arms. Each affects the other, but in a sense they exist in orthogonal planes. War is hardly a game, and wargaming certainly is not war. Hopefully, military history reflects past reality, but wargaming reflects potential reality—in the future or the past. Wargaming can also influence future reality and, consequently, military history.

Military history is full of painful insight about the end states of war. For example, due in part to the Versailles Diktat following World War I, that conflict certainly was not the "war to end all wars." The aftermath of World War II was also enigmatic, leading to the cold war and Korea, among other problems. The Korean conflict clearly has not yet left us. The denouement of Vietnam was hardly spectacular. We are still heavily engaged with no-fly zones in Southwest Asia—as Maj Brent Talbot and Lt Jeffrey Hicks remind us in their article. And Europe is still haunted by the Balkans nightmare, despite world wars and air campaigns like the recent one over Kosovo—analyzed in Lt Col Paul Strickland's piece on Operation Allied Force. Military leaders are well aware of war's end-state dilemmas; yet, despite much focus on desired end states, historical reality reflects many undesired outcomes.

Wargames might also provide insight about ending war, but usually they do not. Why? The answer is that wargames support their intended objectives, and although many of them focus on desired end states of war, they are not specifically designed to do that—thus, in practice, they don't. Typically, an educational wargame begins with growing political, economic, and social unrest in one or more conceptual theaters. Then the scenario builds, with increasing problems leading to open hostilities and consequent decisions to engage militarily. In this process, wargaming students concentrate on the difficult challenges of deploying, employing, and sustaining military forces—and hopefully learn something in the process. Unfortunately, however, learning often stops there and does not include grappling with issues about the desired end states after the termination of shooting.

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*Wargame, used as a single word, runs contrary to current English lexicographical practice. But with an eye toward the German rendering of the concept in the single word *Kriegsspiel*, for purposes of simplicity in this issue of *APJ*, we spell the term—and its variants—as one word.

By the time most educational wargames reach the end state of war, students are exhausted and eager to finish (as are combatants in real war). Hence, wargames often terminate in a fizzle because students' minds are elsewhere, preparing to "go home."

What we need is specifically designed end-state wargaming, but one has to look far and wide to find it. We should begin conceptually with the war(s) already long into the fight and the major focus of the wargame on the end—and beyond. This would provide the time and focused mental effort necessary to really work through the complex end state of war fighting, involving the myriad military, political, economic, and social ramifications.

As students of military history, how might we see better end states from war? Because wargaming can, indeed, influence reality, end-state wargaming needs to be a reality.   ☐

Ricochets and Replies

PARTING THOUGHTS ON *APJ*'S FUTURE

My retirement in September makes this the last issue in which I will be identified as *APJ*'s senior editor. To mark the occasion, the editor, Lt Col Eric Ash, has granted me the space to share some final thoughts on my two-and-a-half years with *APJ*.

I won't bore you with the usual platitudes: "It's been a challenging and rewarding experience" (it was); "I was privileged to work with some great people" (I was); and "The editor's a great boss" (I had the privilege of working for three editors, and all were outstanding officers and exceptional choices to protect and nurture the Air Force's professional dialogue). Nor will I extol the changes we have made to improve the publication's content and visibility (even though I am particularly proud of our recent accomplishments).

Instead, I wanted to leave you with a few observations concerning the nature of the journal and its future. For, in spite of the self-congratulatory tone above, I fear that future is by no means assured to be a long or prosperous one. Does that sound alarmist? And, you may ask, how can it be so when I have just said that *APJ* is currently in good hands with positive trends?

I believe that the success of this professional journal results from a balance—perhaps *healthy tension* is a better term—between three major stakeholding groups: the editorial staff, senior leadership, and readers and contributors (with the officer corps as the main focus). *Tension* conveys the right image, as all the interested parties try to pull *APJ* in their direction. As long as these groups exert more-or-less equal forces in opposing directions, a rough—but hopefully intellectually stimulating—form of equilibrium is maintained. However, if someone pulls too hard or gives up—and if the resulting distortion is large or lasting—then the results can be catastrophic. This is no mere conjecture, as demonstrated by the demise of *Air University Review.*

What would cause the imbalance? Given competing and conflicting demands for time, it is easy to see how officers may come to believe that supporting or even monitoring the profession's dialogue is a luxury they cannot afford. More than this, both human nature

It Ain't New

REP. IKE SKELTON (D-Mo.)*

Editorial Abstract: What follows is wise counsel about the importance of paying attention to history. The Honorable Ike Skelton reflects on similarities among various historical events and our technological, organizational, and leadership challenges in the military today. Particularly in the joint and coalition arenas, we can profit from the beneficial insight that historical analysis provides. As the preeminent military power in the world today, we should remain cognizant of historical precedents if we wish to continue to successfully organize, train, equip, and employ aerospace power.

Unless history can teach us how to look at the future, the history of war is but a bloody romance.

                                                                    —J. F. C. Fuller

I N MY ROLE as ranking member of the House Armed Services Committee, I rely on the lessons of history to help me understand and reach decisions about the future of the armed forces of today. Over the years, I have discovered that most dilemmas that face the military are actually not new issues. Frequently, I find similar situations from the past to use as guideposts to frame the issues of today.

Some national-security professionals, both civilian and military, think that a brand-new era of warfare is at hand. They believe that modern battles will be joint operations fought by loose coalitions of countries with various national interests. They also believe that US Air Force, Army, Navy, and Marine Corps forces will use controversial weapons produced by twenty-first-century technological breakthroughs. In fact, true students of military history realize that these concepts—joint operations, coalition warfare, and the integration of new technology—have their roots in battles of yesteryear. They look to the past for lessons on how to fight today.

Joint Operations

The nature of modern warfare demands that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more important tomorrow.
                                   —Gen John Shalikashvili

I've noticed an increase in the number of people who assume that joint operations began after enactment of the Goldwater-Nichols Department of Defense Reorganization Act of 1986. Nothing could be further from the truth, although our most recent well-known and successful joint operation—Desert Storm—owes a great deal of its success to that important legislation. The truth is that

the United States armed forces have a long tradition of cooperation among the services in order to accomplish their missions.

One of America's First Joint Operations: The Siege of Veracruz

For example, the siege of Veracruz in 1847 during the Mexican War was the most successful of many joint operations during that war.[1] This operation, planned and executed by the Army and Navy, represented the first major amphibious operation in American history and the largest one conducted until World War II. Maj Gen Winfield Scott, the senior Army commander, developed a plan that was clearly joint in every sense of the word. He placed great reliance on the Navy in order to execute his plan, including the unprecedented step of putting Army transports temporarily under the command of Commodore David Conner of the US Navy.[2] General Scott also created a joint procurement process and developed command and control procedures to allow the Army and Navy to communicate with each other during the operation. Army troops on the transport ships needed small landing craft in order to get ashore, so Scott had "surfboats" specifically constructed for the amphibious assault. Although these vessels were contracted through the Army quartermaster, a naval officer—Lt George M. Totten—designed them.[3] In order to synchronize the Army and Navy effort, General Scott and Commodore Conner worked out a new set of signals for supporting fires, loading surfboats, and assaulting the beach because the existing signals assumed an all-Army invasion.[4] Once the Army troops assembled onshore, the Navy brought guns and personnel off the ships to Army emplacements in order to coordinate artillery efforts from ship- and land-based artillery. The landing and successful siege at Veracruz opened

the way for more victories during the Mexican War, which resulted in the acquisition of additional US territories.

A Modern-Day Joint Operation: Desert Storm

Nearly 150 years after the siege at Veracruz, Gen Norman Schwarzkopf of the US Army commanded one of history's most successful joint military operations. He planned to maximize the military services' unique capabilities at each stage of the campaign to defeat Iraq. The offensive air campaign phase of Desert Storm integrated Air Force, Navy, Marine, and—to some extent—Army airpower to strike critical Iraqi targets. His determination to use the best of what each service had to offer continued into the ground-campaign phase. On G day, US ground forces, consisting of two Army corps and a Marine expeditionary force, together with coalition ground forces, assembled more than two hundred thousand soldiers to face the Iraqis. Numerous ground-attack aircraft continued to bomb hostile artillery sites, armored units, supply vehicles, and troops. Naval forces also contributed to the ground offensive. Surface ships supported amphibious operations, and the USS *Missouri* (BB 63) and USS *Wisconsin* (BB 64) bombarded Iraqi coastal positions and provided naval gunfire support to advancing troops.[5]

General Schwarzkopf was instrumental in keeping the joint effort on track. When conflicts arose among the services over their roles, Schwarzkopf adjudicated their differences. Early in the conflict, for example, he had to settle a disagreement between the Navy and Air Force concerning beyond-visual-range rules of engagement for attacking hostile aircraft.[6] Fearing incidents of fratricide, the Air Force wanted a friendly aircraft to make two types of independent verification of hostility before its fighter aircraft launched air-to-air missiles. Since Navy aircraft could conduct only one type of verification, they wanted an airborne warning and control system (AWACS) aircraft to perform the second verification. Otherwise, Navy fighters could not use the Phoenix air-to-air missile at opti-

mal range. The Air Force resisted using AWACS, believing that it did not provide an accurate location of hostile fighters when they flew in proximity to friendly aircraft. When Vice Adm Stan Arthur and Lt Gen Chuck Horner, the Navy and Air Force component commanders, respectively, could not reach an agreement, they asked General Schwarzkopf to make the final determination. He supported a modified Air Force position that resulted in both Admiral Arthur's and General Horner's continuing their good working relationship and respecting each other's viewpoints.[7]

One can examine the success of joint operations during Desert Storm by considering the relationship among General Schwarzkopf, the supporting commanders in chief (CINC), and the service chiefs. US Transportation Command provided the logistics to get the necessary troops and equipment in-theater; US Space Command warned of Scud missile launches, and its Global Positioning System satellites facilitated operations; and the geographic CINCs provided air, sea, and ground forces from their theaters. The service chiefs fulfilled their roles as force providers to General Schwarzkopf, giving him all the well-trained and equipped forces he needed. They also acted as a source of information on how best to employ these forces without trying to interfere in the command relationships established by the Goldwater-Nichols Act.

Coalition Warfare

There is only one thing worse than fighting with allies—and that is fighting without them.
        —Sir Winston S. Churchill

The Department of Defense (DOD) has increased the emphasis on training and fighting with our allies, especially since the end of the Persian Gulf War. It is important to recognize that, because they lack either the support of world opinion or the military capabilities to operate independently, few countries can fight alone. The need for countries to form alliances based on common national in-

terests or security concerns has existed for millennia.

The Duke of Marlborough: Skilled at Coalition Warfare

John Churchill, the duke of Marlborough, acted as commander of British, Dutch, Prussian, Danish, and other Grand Alliance forces during the War of the Spanish Succession, fighting four battles successfully against the French army from 1701 to 1712. For nearly 10 years, his personal diplomacy effort, unusual at the time, was the driving force behind the daunting task of keeping the incredibly fractious coalition together. Churchill understood that face-to-face meetings with allied rulers and ministers in Berlin, Vienna, and the Hague could prove more effective in resolving difficulties and formulating plans than written communication.[8] Because of his efforts, the allies gave him their confidence and trust, as well as control of their armies.

Churchill's attempts to win over the members of the Grand Alliance paid off for him years later while he prepared for his last campaign against the French in 1711. When his enemies in England's new Parliament wanted to replace him, other leaders of the Grand Alliance spoke on his behalf. The duke of Hanover and the king of Prussia threatened to withdraw their troops unless he remained in command, which led the rest of the Grand Alliance to state their strong belief that he should continue to be in charge. They saw him as their champion, especially since he had already led the alliance to victory in three battles against the French.[9]

Gen Wesley Clark: Leading NATO's First Fight as an Alliance

Maintaining a cohesive alliance or coalition today is just as important, if not more so, than in the past. As the supreme allied commander, Europe in mid-1999, Gen Wesley Clark of the US Army led the North Atlantic Treaty Organization's (NATO) first military campaign, Operation Allied Force. In addition to trying to convince Yugoslav leader Slo-

bodan Milosevic to pull his forces out of Kosovo, General Clark had to ensure that internal differences among NATO countries concerning the conduct of the campaign and the desired outcome did not pull NATO apart.

To General Clark, maintaining alliance cohesion during Allied Force was just as important as avoiding casualties, targeting Serb forces and associated targets, and minimizing collateral damage.[10] He had a difficult time keeping his targeting strategy on track because every target required unanimous approval of the allies, some of whom opposed the entire campaign or certain aspects of it. For example, Greece and Italy opposed an extended bombing campaign, France resisted plans for a naval blockade, and Germany opposed any consideration of a ground war.[11] General Clark had to rely on his diplomatic skills to convince NATO allies of the need to escalate the campaign and to consider the possibility of a ground war. He used personal phone calls and meetings to persuade them to reduce bombing constraints in order to intensify the campaign, yet maintain allied consensus and cohesion.[12]

In an effort to obtain approval of two particularly important targets—the Yugoslav Interior Ministry and the headquarters of the Serbian special police—General Clark personally briefed Javier Solana, NATO secretary-general, on the intricacies of targeting. He included such details as the blast radius of warheads and how the desired point of impact controlled whether the building would collapse inward or explode outward. Clark thought it important to send a message by striking these targets during the first missions to Belgrade. The North Atlantic Council debated the request but in the end left the final decision to Secretary-General Solana, who gave his approval a few days later.[13]

General Clark earned the admiration of NATO for his leadership in the Balkans. During the change-of-command ceremony for General Clark, Lord Robertson, Solana's successor as NATO secretary-general, praised him for his "unique combination of military

expertise, political knowledge and diplomatic skill."[14] Lord Robertson went on to say that General Clark was "the right man in the right place at the right time" to lead the first major military offensive in the 50-year history of the alliance. General Clark's command ensured NATO's success.

Allies with Unequal Military Capabilities Benefit from Unity

In addition to ensuring shared goals among the alliance nations, coalition warfare involves another concern. In the year since the end of the bombing over Serbia, the United States and the rest of the NATO countries have had an opportunity to study the lessons learned from NATO's first military operation. Among these many lessons, everyone emphasizes and agrees that the European countries have fallen behind the United States, both militarily and technologically—a matter of great concern that NATO will address over the next few years. Again, this situation is not new to us, and we should not let it interfere with our reliance on our allies during times of crisis. There was a time in American history when the opposite was true—we Americans fielded the inexperienced, poorly equipped force and had to rely on the superior capabilities of our European allies.

Specifically, the American Continental Army largely owed its victory over superior British forces during the American Revolution to the military assistance of France, which sent officers, soldiers, gunpowder, and ships to the Americans. The commander of French forces in America also had a strong hand in shaping the objectives of the war. Jean-Baptiste-Donatien de Vimeur, comte de Rochambeau, argued for an attack on Lord Charles Cornwallis in the south despite Gen George Washington's desire to lay siege to New York instead.[15] The comte de Rochambeau had already begun planning for a siege at Yorktown when he requested assistance from the commander of the French fleet in the Caribbean. Adm François-Joseph-Paul de Grasse responded by canceling all other missions, readying every ship, obtaining troops and field artillery, borrowing money, and immediately setting sail for the American coast. The tremendous support for the operation at Yorktown convinced General Washington to march his troops south instead of north to New York.

Meanwhile, the French defeated the British fleet off the Virginia coast, ensuring that Lord Cornwallis would not receive the reinforcements he urgently needed from New York. The allied army began preparations for the offensive, supported by the accurate bombardment of the British by the French cannoneers. American and French troops successfully attacked, forcing Lord Cornwallis to surrender. British reinforcements arrived five days later, but the French fleet still controlled the Chesapeake. The British returned to New York without engaging French forces.[16] Despite the disparity in expertise, the American and French military efforts complemented one another. The Americans fought for freedom and the birth of a nation, while the French brought the necessary professionalism, technical expertise, and equipment.

Operation Allied Force: American Military Technology Pulls Ahead

It quickly became clear during Allied Force last year that US military capabilities have dramatically pulled ahead of those of our European allies. The Kosovo after-action report to Congress noted this gap, especially in the areas of precision strike; mobility; and command, control, and communications.[17] This forced the United States to conduct the majority of the precision strike sorties, especially during the first days of the conflict when the Yugoslav air defenses remained fully operational. As it became clear to the NATO political and military leadership that the United States would bear the brunt of the cost of the military effort, the allies agreed that the Europeans would cover the majority of the cost of the peace enforcement and reconstruction efforts in Kosovo. Although the exact division of costs is the subject of spirited debate, the Europeans seem to be living up to their promise.

Even though the United States led the military effort during Allied Force, we could not have carried out the entire operation without assistance from our European allies, who provided personnel, equipment, and—more importantly—political and diplomatic support. One should also note that the United States benefited from use of the NATO allies' military infrastructure, including military bases, airfields, and airspace. Although the B-2 bomber proved very effective in operating from Whiteman Air Force Base in Missouri, aircraft usually must launch from a location much closer to the theater in order to accomplish their mission. For that reason, US forces deployed to facilities in countries closer to Kosovo and Serbia—such as Italy, the United Kingdom, Germany, Spain, France, Hungary, and others.

However, the gap in military capability—certainly a reason for concern and a topic of discussion at the summit recognizing the 50th anniversary of NATO—could affect future alliance efforts. To reduce this gap, NATO adopted the Defense Capabilities Initiative, which seeks to enhance allied capabilities in deployability and mobility; sustainability and logistics; effective engagement; survivability of forces and infrastructure; and command, control, and information systems. The overall goal is to improve interoperability between US military forces and the rest of NATO.

Integrating Technological Innovations into the Military

We must be the great arsenal of democracy.
 —President Franklin D. Roosevelt

DOD feels strongly, as do some members of Congress, that other nations can overcome the technological advantage long enjoyed by the United States if we don't continue to invest in research and development and field the weapon systems resulting from these efforts. Counterarguments come from those who believe that, although we eventually will have to modernize, our technological lead is so great now and for the foreseeable future that we can afford to "take a breather" from a policy of constant modernization. Congress is charged with finding the balance between the two sides. Unfortunately, this is not a simple exercise, and we will measure the consequences of being wrong in the loss of America's sons and daughters. I find it helpful to look to history to study another time when America faced a similar situation.

The current debate concerning precision warfare and the role it should play in future conflicts has a strong precedent in the integration of the airplane into the US military. Prior even to the debates about establishing the Air Force as a separate branch of the armed services, controversy existed over the capabilities and limitations of the airplane and the role it should play. The airplane and precision-guided weapons are parallel issues almost one hundred years apart, with consequences affecting doctrine, operations, tactics, and, certainly, resource priorities.

Airplanes: Discovering Their Military Usefulness

The introduction of the aircraft to the US military did not proceed smoothly. Many political and military leaders failed to see the need to expend resources to develop military aviation to its fullest potential. After World War I, Army leaders for the most part considered the airplane little more than another form of reconnaissance and artillery, and the United States did not follow Great Britain's example in establishing a separate air force. As the United States began to focus on domestic spending after the war, Gen Henry "Hap" Arnold and Gen William "Billy" Mitchell began a public-relations campaign around the country to increase support for funding the Air Service. The support generated by their demonstrations forced the Navy to agree to a bombing test in 1921. After modifying the official rules of the test, Air Service pilots sank three captured German vessels, including the "unsinkable" battleship *Ostfriesland*. Two years later, the Air Service successfully repeated the tests by sinking two obsolete American battleships. Despite these

achievements, the tests failed to gain any significant funding from Congress.

In addition to demonstrating the airplane's potential military capabilities, early airpower advocates began to develop airpower theory, doctrine, and tactics. The Air Corps Tactical School at Maxwell Air Force Base, Alabama, is generally credited with considering the early airpower theories espoused by Mitchell, Gen Hugh Trenchard, and perhaps Gen Giulio Douhet—and with establishing the first airpower doctrine developed in the United States.[18] This doctrine advocated precision, high-altitude, daylight strategic bombardment against the enemy's military-industrial complex. However, its publication did not convince skeptics in Congress—or the Army and Navy—of the usefulness of airpower. Only the success of actual strategic-bombardment missions and support to the ground troops during World War II convinced naysayers of the value of military missions for the airplane—and of the need for an independent Air Force.

Surprisingly, remnants of the debate about the role of airpower and its ability to play a decisive role in conflict continue in Congress and the Pentagon today, despite the critically important airpower demonstrations in both Desert Storm and Allied Force. The airplane now performs an extensive array of missions for all of the services, and I would not want to fight an adversary without the best aircraft America can produce.

Precision-Guided Weapons: Living Up to Their Promise

Today, I see many similarities between the airplane's struggle for acceptance and the way the armed forces are integrating precision-guided munitions (PGM) into the force structure. The effort to achieve more accurate weapons began in World War I and approached modern capabilities with PGMs toward the end of the Vietnam War. However, not until Desert Storm did the American public get a close-up view of the capability of PGMs. Increased emphasis on precision will drive changes in military doctrine, opera-
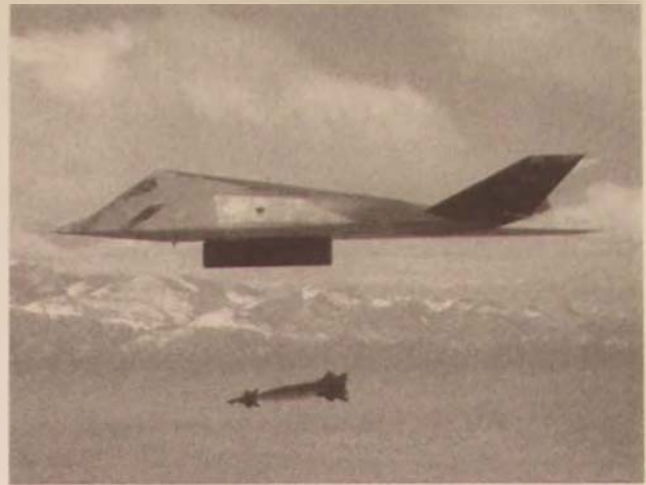
An F-117A Nighthawk drops a laser-guided bomb.

tions, and tactics. Already, it is clear that we need to make our intelligence, surveillance, and reconnaissance capabilities more responsive and accurate in order to support the efficient targeting of precision-guided weapons. Other questions remain concerning their role, compared to that of traditional weapon systems, and the impact they will have on other military concepts, such as maneuver.

Each of the services must examine the part of their war-fighting doctrine that addresses precision-guided weapons and develop the best plan for employing precision capability. They need to answer questions about when to use these weapons and against what types of targets. They should be able to logically answer critics who claim that striking a $50,000 target with a million-dollar missile is unjustified, whether it is based on reducing risk to our service members, the unique importance of the target, or some other factor. That done, the Pentagon must educate American leaders and the general public about these new weapons. Just as education about the airplane many years ago led to building the world's greatest air force, so does the nation need to learn the capabilities and limitations of precision-guided weapons in order to understand why they represent a wise investment for the future.[19]

We need educational efforts not only to justify resources but also to effectively employ PGMs against critical targets. For example,

during Desert Storm, coalition political and military leaders hesitated to allow the bombing of high-value targets located in or near population centers. However, after receiving briefings detailing the accuracy of PGMs, these leaders felt more comfortable using them against targets in cities.[20] As previously mentioned, General Clark gave the same types of briefings during Allied Force in order to gain NATO consensus to bomb certain targets in highly populated areas.

Conclusion

My study of history tells me that the challenges facing the military today—and into the future—are not new. The US military must continue to develop leaders who understand *jointness* in order to fight as a joint force. This is important because the nation needs the strength created when all of the armed services work together. In addition, because America will continue to lead and participate in coalitions, the services must prepare military leaders of tomorrow to operate comfortably in a *multinational environment.* They must understand the different national interests that may drive their counterparts and must recognize allied military capabilities in order to get the most out of their contributions. Finally, the United States cannot afford to haphazardly integrate *new technology* into its force structure. We must look ahead in order to understand the potential implications of technology and to ensure that theory, doctrine, and strategy do not fall behind. One of the best ways for future military leaders to prepare is to study military history. It might surprise them to discover how much yesteryear has in common with today. In other words— it ain't new.   □

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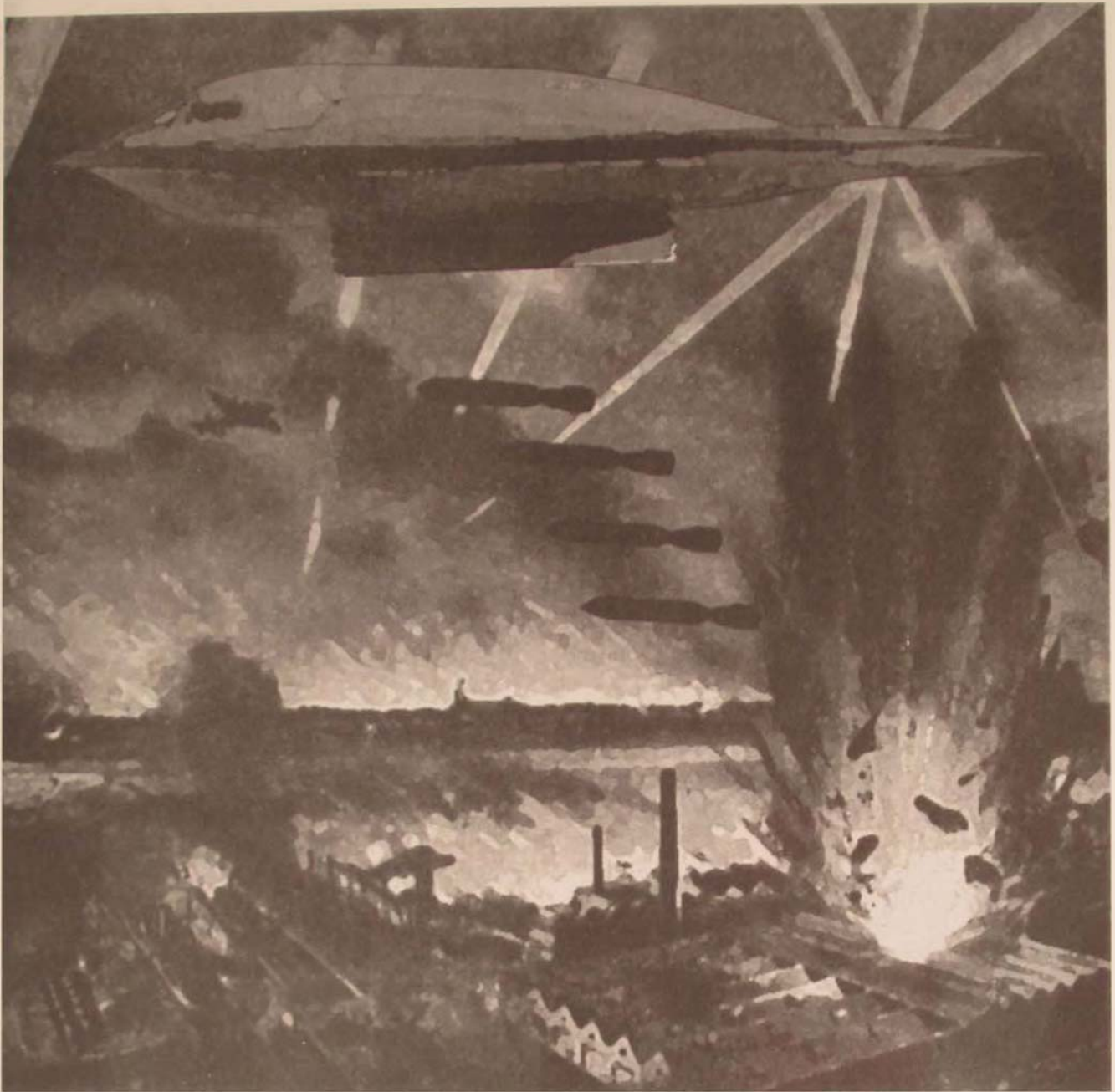
USAF Aerospace-Power Doctrine

![Editor's Choice]

Decisive or Coercive?

LT COL PAUL C. STRICKLAND, USAF

Editorial Abstract: Is our doctrine geared to serve the funding war more than the shooting war? The author investigates this question in light of Kosovo, pointing out some interesting internal friction points. Using typologies of "positive" and "negative" goals, he argues for a more effective shooting-war doctrine based on coercive aerospace power.

War is too important to be left to the generals.

—Georges Clemenceau

WHILE NORTH ATLANTIC Treaty Organization (NATO) aircraft prosecuted an air campaign of unprecedented precision against the former Republic of Yugoslavia, NATO marked its 50th anniversary in Washington, D.C. NATO solidarity was at stake. For 78 days, the world's most powerful alliance appeared on the verge of fragmentation. To NATO's relief, Serbia capitulated after a military campaign fraught with gradualism and obtrusive political meddling. For many airpower proponents, Operation Allied Force vindicated decisive airpower doctrine. For others, Allied Force was a misapplication of core US Air Force aerospace doctrine. Without NATO's political interference, many believed the air campaign would have netted a more rapid and asymmetric victory for the alliance.

Allied Force highlighted a significant doctrinal imbalance between decisive and coercive airpower. US Air Force aerospace-power doctrine focuses almost exclusively on the idea that airpower is decisive in a major theater war scenario. Consequently, it minimizes discussion regarding the coercive application of airpower in nontraditional types of conflicts like Kosovo. The result is a doctrinal void of guidance in the education of future Air Force leaders to understand the complexities and truly coercive nature of airpower. Allied Force was a prime example of coercive airpower application resulting in far less than decisive outcomes. The root cause of this ineffective coercive air campaign nested in clashing positive and negative political/military objectives.

In his book *The Limits of Air Power*, Mark Clodfelter defines positive objectives as "those that [are] attainable only by applying military power" and negative objectives as goals "achievable only by limiting military force."[1] He explains "that political controls on air power flow directly from negative objectives, and that the respective emphases given to positive and negative aims can affect air power's political efficacy."[2] Our purpose here is not to endorse Clodfelter's choice of terms, which can be misleading if misinterpreted to imply a moral valuation. Yet, simply using his typology affords a clearer understanding of Kosovo's complex interaction of military and political factors. Clodfelter's intent is to strike a comparison between potential bipolar military and political objectives that collide to create opposing and coercive consequences of military action. The air campaign over Kosovo was just such an example.

Allied Force endured strong interference by NATO's political leadership, which revealed tension between NATO's negative political objective (preserve the alliance) and the positive military objective (destroy or compel Serbian forces to depart Kosovo and halt ethnic cleansing). This chasm between negative and positive objectives fostered friction and frustration among senior officers, which worked against a rapid conclusion of the air campaign. Over time, several factors plus airpower (lack of Russian support, the involvement of the Kosovo Liberation Army, and Serbian successes in achieving their tactical objectives), coerced Serbian forces to pull back from Kosovo. One can argue, then, that airpower was indecisive in preventing regional destruction, refugee migrations, and ethnic cleansing—all originally positive military objectives. Clearly, NATO's negative objective to preserve the alliance dominated the decision to implement a laborious incremental air campaign. Moreover, counter to the positive effects of unlimited application of airpower, the gradualism of Allied Force may well be the norm for future coalition conflicts. In contrast to decisively oriented US Air Force aerospace-power doctrine, all positive military objectives became subordinate to the negative political objective, and Allied Force used coercion to oust the Serbian army from Kosovo.

Allied Force raises questions concerning the scope of US Air Force airpower doctrine. Is doctrine intended as a practical warfighting educational medium, or is it a marketing strategy designed to compete with sister services in a scarce budget environment? In fairness, the US Air Force Doctrine Center is tackling such issues by focusing doctrine at an operational warfighter's level. Several revised doctrinal publications, such as Air Force Doctrine Document (AFDD) 2-1, *Air Warfare*, address a broad spectrum of operational applications of airpower. The documents correctly emphasize the importance of understanding the ambiguities inherent in warfighting and applying sound doctrine: "Training, therefore, involves mastering the necessary level of knowledge and then developing the judgement to use that knowledge in the fog of war."[3] Yet, there is little mention that the application of airpower might not be decisive, might not be allowed to attack in parallel, and might not be allowed to leverage its asymmetrical advantages against a nontraditional enemy. In this case, AFDD 2-1 lacks an important discussion about applying airpower outside current doctrinal thinking.

AFDD 2-1 describes a "new American way of war" that "uses the rapid employment of sophisticated military capabilities to engage a broad array of targets simultaneously, strongly, and quickly, with discriminate application, to decisively shape the conflict and avoid the results of previous wars of attrition and annihilation."[4] The essential point rings clear: Modern aerospace power is decisive, and because it is decisive, the Air Force must not repeat past mistakes where airpower was applied incrementally, gradually, and with coercive effects. In effect, AFDD 2-1 prescribes a set of standards demanding decisive execution by airmen.

Future Aerospace-Power Doctrine: Decisive or Coercive?

In light of the assumption that the United States will likely fight all future conflicts as a multilateral coalition, is the US Air Force bet-ter served by adopting a doctrine that reflects the decisive or coercive character of airpower? Which of the two better serves the war fighter when faced with major theater war (e.g., the Gulf War) or nontraditional conflicts like Kosovo?

This chasm between negative and positive objectives fostered friction and frustration among senior officers, which worked against a rapid conclusion of the air campaign.

The answer resides in the expectations of military commanders and how those expectations are interwoven into service doctrine. In his discussion on the coercive nature of airpower, Robert Pape addresses the need for a fresh assessment of aerospace-power application. In the process, he postulates three distinct types of coercive military strategies: campaigns of punishment, risk, and denial. First, *punishment coercion* campaigns inflict "suffering on civilians, either directly or indirectly by damaging the target state's economy. Bombing or naval blockades can cause shortages of key supplies such as food and clothing or deprive residents of electrical power, water, and other essential services."[5] By design, punishment campaigns are meant to quickly compel the opposing government to concede or to convince the population to revolt. Second, *risk coercion* strategies center around gradual destruction of civilian and economic targets "in order to convince the opponent that much more severe damage will follow if concessions are not made."[6] Third, *denial coercion* strategies specifically "target the opponent's military ability to achieve its territorial or other political objectives, thereby compelling concessions in order to avoid futile expenditure of further resources."[7] After an analysis of World War II, Korea, Vietnam, and the Gulf War, Pape concludes that "coercion by punishment rarely

works. . . . [W]hen coercion does work, it is by denial."[8]

This insight offers a way to assess the application of coercive aerospace power in relation to the positive and negative military and political objectives of Operation Allied Force. Pape believes that

> studying military coercion may be even more relevant to policy now than it was in the past. The end of the Cold War and the rise of potential regional hegemons are shifting national security policy away from deterring predictable threats toward responding to unpredictable threats after they emerge, making questions about how to compel states to alter their behavior more central in international politics. This trend is also apparent in the growing role of airpower in U.S. military strategy.[9]

Ethnic cleansing in Kosovo presented just such a challenge to aerospace power.

Operation Allied Force Planning

The NATO air campaign against the former Republic of Yugoslavia stemmed from the 1991–95 genocide in Bosnia-Herzegovina. Politically, NATO aimed to prevent a repeat of the atrocities committed in Bosnia, partly because NATO members saw the Balkans as the seat of historic instability in Europe. Following the initiation of Serbian military operations to cleanse the Kosovo province, NATO rallied around reactionary diplomatic negotiations in Rambouillet, France, and started planning for military action against Serbian ground forces.

As early as June 1998, US planners developed multiple versions of an air campaign against Serbian forces. These planners dealt with three critical issues: military and political objectives, the proposed command relationships and command structure, and senior leadership dynamics.

Strategic Military and Political Objectives. Prior to the first bomb crater in Kosovo, NATO's primary positive military and political objectives were to stop Serbian forces from ethnic cleansing and to compel Slobodan Milosevic, Serbia's president, to recall his military forces

from Kosovo. As such, Gen Wesley K. Clark, the supreme allied commander Europe (SACEUR), faced a daunting task of selling a credible air campaign plan to 19 ministers of defense while convincing NATO members they were accountable for their commitments to use military force, if so ordered by the NATO North Atlantic Council (NAC). For reasons of security and capabilities, selected US Air Force planners executed nearly all combat planning efforts, and NATO planning remained inconsequential and limited. Consequently, General Clark's priority became consensus-building among NATO political members who knew little about the detailed air campaign plan. SACEUR's overall positive political objective clashed with the emerging negative political objective of maintaining NATO consensus and cohesion. As a result, SACEUR's finalized plan, a three-phase air campaign, fell drastically short of US Air Force expectations to achieve the positive military objectives. Even the purest notions of applying decisive aerospace doctrine became subservient to the negative political impact resulting from a lack of consensus by NATO.

SACEUR's guidance regarding air campaign planning was perceived by warfighting staffs as reactionary and unpredictable. The NATO Combined Air Operations Center (CAOC) at Vicenza, Italy, and the US Air Force's 32d Air Operations Group (AOG), Ramstein, Germany, received evolving planning guidance depending on SACEUR's adjudication of the conflicting negative political and positive military objectives. As chief of staff at the CAOC, and also as a temporary special assistant to SACEUR, Col William L. Holland, USAF, reflected on the air campaign ambiguities and the negative influence of political objectives on the planning process:

> The NATO Advisory Council (NAC) was supposed to approve the planning, but the guidance came from a variety of sources. We were given direction, and alternative plans, or branches and sequels, that weren't branches and sequels. They were totally different plans based on different guidance. We planned a lot and produced few valid plans. It was a planning

nightmare. Planning was more a reaction than strategic vision. As the environment, or the media changed, SACEUR gave reactive planning guidance.[10]

The resultant air campaign plan was a compromise between "punishment," "risk," and "denial" coercive strategies that placated NATO's fragile consensus.

Phase 1 involved striking Serbian integrated air defense systems and command-and-control bunkers in order to gain local air superiority. In Phase 2, air strikes were planned against military targets below 44 degrees north latitude. These strikes included "risk coercive" interdiction targets and "denial coercive" targets against Serbian fielded forces in Kosovo. "Punishment coercive" targets (leadership, economic, and population targets in and around Belgrade) were specifically excluded. In Phase 3, NATO aircraft were to strike "punishment" targets north of the 44th parallel, including Belgrade targets.[11] In the end, this phased campaign revealed the incremental and gradual air campaign strategy embraced by NATO and SACEUR.

From the perspective of the CAOC and specifically Lt Gen Michael C. Short, the combined forces air component commander (CFACC), the NATO-approved air campaign plan failed, due to political constraints, to employ decisive aerospace power to achieve political and military objectives. General Short felt a swift "punishment" air campaign was the answer by arguing

> many times to his superiors that the most effective tactic for the first night of the war would be a knockout punch to Belgrade's power stations and government ministries. Such a strike had worked in Iraq in 1991, and it was the foundation of air power theory, which advocates heavy blows to targets with high military, economic, or psychological value as a way to collapse the enemy's will.[12]

The CFACC's arguments centered around a belief that the air campaign plan failed to target the correct Serbian centers of gravity (COG). US Air Force aerospace-power doctrine describes a COG as a target of "fundamental strategic, economic, or even emotional importance to an enemy, loss of which would severely undermine the enemy's will or ability to fight."[13] General Short felt strongly that the Serbian Third Army in Kosovo was *not* the COG that, if destroyed, would compel Milosevic to stop ethnic cleansing.

While General Short favored an air war of "punishment," General Clark envisioned a campaign of "coercive risk and denial." SACEUR sought to target gradually the Serbian Third Army (south of the 44th parallel) and to compel Milosevic's forces to withdraw from Kosovo. Although General Clark's "risk and denial" air strategy stiff-armed decisive aerospace doctrine, he felt this was the best operation he could get NATO to approve.[14] Soon after the 1998 Rambouillet peace agreements began to unravel, SACEUR perceived the negative political objective of NATO cohesion: "I was operating with the starting assumption that there was no single target that was more important than the principle of alliance consensus and cohesion."[15]

Application of decisive aerospace-power doctrine was usurped by NATO political constraints, and the result was a "risk" and "denial" strategy. Although this approach subverted the decisive application of airpower, it should be considered a potential norm for most future US/coalition-based conflicts. Whether right or wrong, the negative political objective established the guidance for all remaining Allied Force planning.

The juxtaposition between the CFACC's warfighting concept and SACEUR's strategic guidance caused significant friction. Many of the arguments revolved around a perceived notion that SACEUR did not understand airpower theory. Colonel Holland expressed this frustration:

> There was a lack of understanding about what airpower should do, not what it can or can't do, but what it should do. Our desired air strategy was to take it to the people who had an effect on the fighting. Not the people who were just carrying out the orders. The biggest failing, in my opinion, was a lack of an attempt by the military leadership to explain the strategy, ratio-
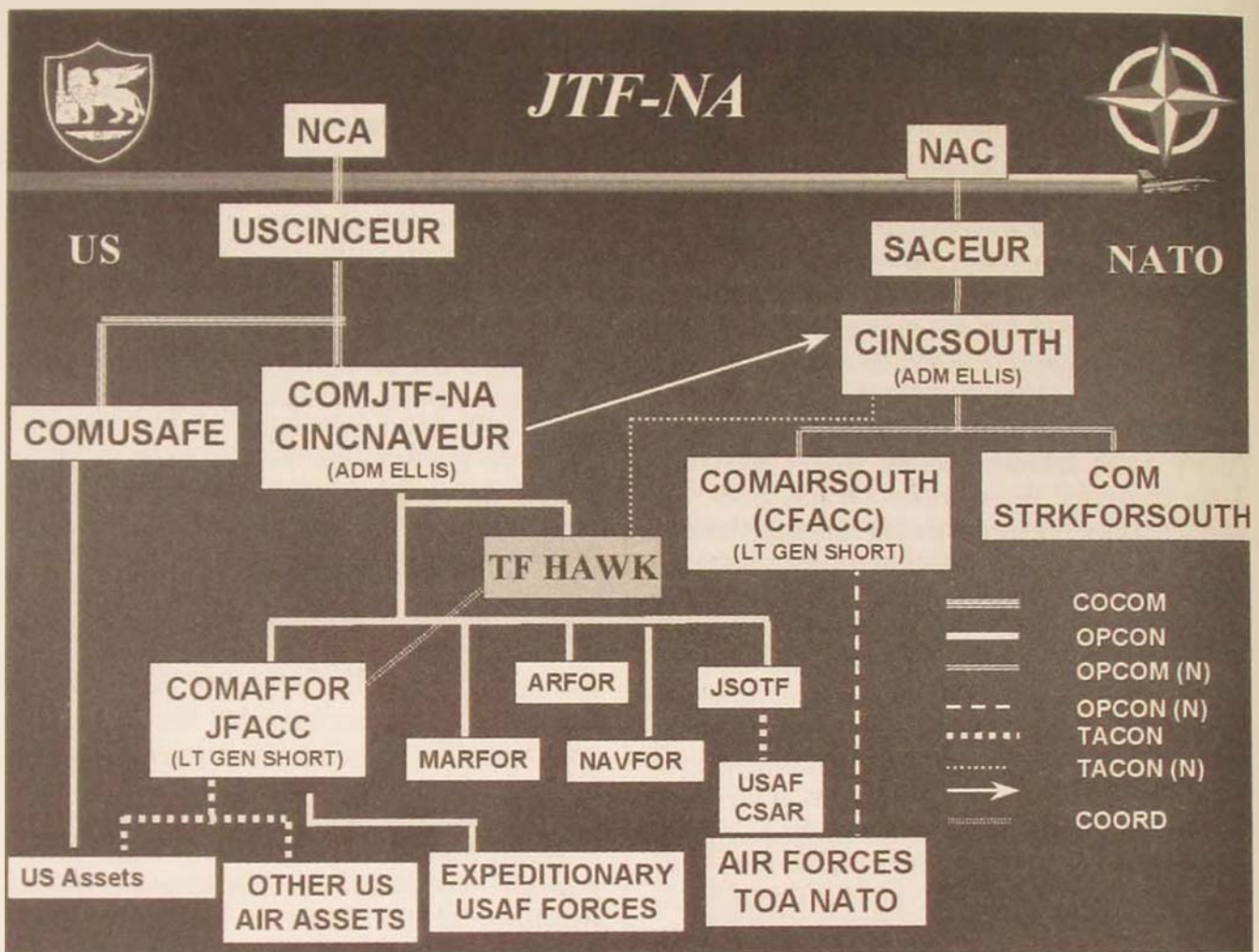
Figure 1. Shown above are the complicated, interdependent command relationships in Operation Noble Anvil (NA), the NATO operations against Serbian forces.

nalize it to the political leadership, that this is what we have to do to accomplish the objectives set forth by NATO.[16]

It is unclear how much political savvy is required to convince politicians on how best to achieve positive military objectives. Moreover, when these positive military objectives clashed with a negative political objective, prosecuting the optimum warfighting plan became secondary to the desired political outcome. Given the likelihood of a broad array of nebulous military and political objectives, Allied Force suggests that in the future, the decisive employment of aerospace power will be supplanted by the coercive application of airpower.

Lack of Unity of Command. Lack of unity of command contributed toward the coercive application of airpower during Allied Force. AFDD 2, *Organization and Employment of Aerospace Power,* highlights the US Air Force doctrinal inclination for clear lines of command authority, arguing command relationships in war should be unified.[17] But this ideal command structure is often not possible politically, particularly in coalition warfighting. In fact, the command structure for Allied Force was complicated by parallel structures (fig. 1).[18]

In Allied Force, multiple factors inhibited unity of command. First, there were dual NATO and US chains of command. General Clark, Adm James O. Ellis, General Short, and Vice Adm Daniel J. Murphy Jr. all wore

dual NATO and US command hats because of US insistence to control specific classified weapons systems. For example, Admiral Ellis, as the joint force commander (JFC), theoretically oversaw all air, land, and sea operations with his skeleton joint staff from Naples, Italy. The Naples staff, however, controlled *only US classified* weapons systems. As the combined force air component commander (CFACC) under Admiral Ellis, General Short controlled *nonclassified US and NATO* assets with a robust warfighting staff from the CAOC in Vicenza, Italy. General Short was the primary warfighter, and yet he lacked direct command authority over critical weapons systems that were not intended to integrate with NATO assets. Near disaster occurred when NATO and US assets shared common times over targets in congested Serbian airspace. Ultimately, the joint task force (JTF) staff impeded the warfighting efforts of the CAOC staff and breached doctrinal concepts of unity of command.[19]

Colonel Holland suggested that the Allied Force command structure reflected a poor understanding of joint/combined warfighting:

> SACEUR stood up the U.S.–only JTF, yet he didn't let the JTF be the warfighter. Admiral Ellis wore two hats, the U.S. and NATO hats, and was stuck in the middle. The JTF should have been built at Lt. General Short's level, and let him be the warfighter. If SACEUR would have looked at it with a mission objective focus instead of a rank focus, he might have drawn the wiring diagram a lot differently.[20]

There were additional mission-oriented reasons why the command structure was faulty. The JTF staff was *not* joint, hardly combined, and not a trained warfighting staff. Admiral Ellis, the JFC, recognized that "JTF-Noble Anvil was not formed around a predesignated (and trained) theater staff."[21] The undermanned JTF staff reflected long-term manpower shortfalls plaguing the United States and the NATO countries. General Short felt the JTF obstructed operations:

> I think the JTF never understood its function. I think the JTF was an unnecessary level that was

inserted for reasons that continued to escape me. We were given the reason that we needed a U.S.–only capability to control U.S.–only assets. We [CAOC] could have controlled the U.S.–only piece. . . . The JTF saw themselves as fighting the air war as opposed to synchronizing the efforts of the components. The JTF was no value added, from my perspective.[22]

The JTF staff interfered with the warfighting staff at the CAOC, particularly in the target-approval process and management of classified US weapons. Decisive airpower doctrine was undermined by a lack of unity of command.

Senior Leadership Dynamics. Senior leadership dynamics worked against sound planning for Operation Allied Force. Historically, the personalities of leaders has affected military operations: Gen Dwight D. Eisenhower struggled mightily with Field Marshal Bernard Montgomery and twice relieved the cantankerous Gen George S. Patton; President Harry S. Truman fired a defiant Gen Douglas MacArthur; and Gen Billy Mitchell was court-martialed for his strident opinions. Allied Force had similarities. According to Admiral Murphy, "There was a fundamental difference of opinion at the outset between General Clark, who was applying a ground commander's perspective . . . and General Short as to the value of going after fielded forces."[23] One heated exchange between the two men ended only when General Clark reminded General Short who outranked whom. General Short himself recognized this aspect of their relationship:

> When SACEUR said something that I thought was out of the ballpark and I took him on as a three-star, I had people call me telling me I can't do that. On one of SACEUR's visits to the CAOC he threw everyone out of the room and remarked that I was very sharp with him. I replied that I didn't mean to be, but was appalled at the guidance given to me. I felt I did everything I could to get SACEUR to understand airpower. I did everything I could to oppose what I thought was bad guidance. I don't absolve myself of the responsibility, and clearly I'm responsible for the air campaign, but I

don't know what more I could've done to get SACEUR to understand the process.[24]

While General Short focused on the positive military objective of defeating Serbia's will and ability to fight, General Clark's range of warfare was conditioned by the negative political objective of NATO cohesion. General Clark "didn't need any convincing about strategic targets," and he too wanted "to strike Serbian forces in Kosovo."[25] But without NATO cohesion, Operation Allied Force may have unraveled a 50-year alliance. General Clark spent much time "fending off proposals from the political leaders of some NATO countries—particularly Italy and Greece—who wanted to suspend the bombing altogether."[26]

In addition to this leadership tension, the video teleconferencing (VTC) medium of communication between General Clark, Admiral Ellis, Vice-Admiral Murphy, and General Short created some misgivings. Daily VTCs were unrestricted to audiences of all ranks. Consequently, when disagreements on objectives or strategies emerged, many people witnessed inappropriate senior-level confrontations. Admiral Ellis noted that VTCs were "subject to misinterpretation as key guidance is filtered down to lower staff levels . . . [and] . . . enables senior leadership to sink to past comfort levels where discipline is required to remain at the appropriate level of engagement and command."[27] Although VTCs allowed expedient communications, they showcased open dissent among key senior decision makers, while in turn fostering a poorly focused air campaign.

Operation Allied Force Execution

From the start of Allied Force, the CAOC was unable to produce a *timely and accurate* air tasking order (ATO). The primary cause was the absence of a doctrinally based joint/combined targeting guidance and approval process. For the first *40 days* of the air campaign, target lists, instead of target sets based on desired effects against Serbian forces, were approved and disapproved spontaneously

during daily VTCs. This procedure was anathema to the ideal envisioned in US Air Force doctrine. Furthermore, it highlighted a lack of doctrinal education, training, or unintentional disregard by senior leaders who assumed the threat of NATO bombing would cause Milosevic to capitulate quickly.

Misapplication of Joint/Combined Air Operations Center Doctrine. AFDD 2 explains the function of a joint/combined air operations center (J/CAOC):

> The commander's guidance and objectives will identify broad categories of tasking and targeting priorities . . . this guidance will also include the apportionment decision. Tasks and targets are nominated to support the objectives and the commander's priorities. The final prioritized tasking and targets are then included in a Master Air Attack Plan (MAAP) that forms the foundation of the ATO.[28]

Doctrinally, the CFACC receives strategic planning guidance from the commander in chief (CINC) or JTF commander. Target sets are developed from a master target list (MTL) and are approved based on the desired effects and objectives. A joint/combined targeting control board (JTCB) convenes to consolidate the target sets into prioritized objective-oriented categories. The resultant joint/combined prioritized target list (JPTL) is incorporated into a master air attack plan, which marries assets to tasking in the form of the ATO.

Strategic guidance should be clear so that nominated target sets have a decisive effect on objectives. Warfighting staffs should be provided a robust MTL that supports the CFACC's effects-based targeting guidance. Also, the CFACC should transmit warfighting guidance to his staff through a daily air operations directive (AOD). None of this occurred during the first phases of Allied Force.

Contrary to sound doctrinal practice, senior military leaders believed "the political objective was to prompt Milosevic to accept the Rambouillet peace agreement, and NATO calculated that by dropping a few bombs Milosevic would do so."[29] At the outset of bombing, the MTL consisted of a meager

?00 targets, of which slightly over 50 were approved for the initial air strikes. The lack of approved target sets perplexed General Short, who recalled thinking that "SACEUR had us all convinced we didn't need very many targets, and we didn't need an air campaign, and Milosevic just needed a little bit of spanking, and it was all going to be done. We never really ran an air campaign in a classic sense."[30]

SACEUR faced a pivotal problem: acquiesce to dissenting political desires of fickle NATO allies or risk damaging NATO cohesion by unleashing "punishment" attacks on Belgrade's population and leadership target sets. With the predominance of the negative objective, SACEUR's only realistic choice was to ensure NATO cohesion and resolve and do what he could about Belgrade's behavior in the margins. NATO's consensus revolved around a brief sanitary operation with limited targets not aimed at leadership or population COGs. The initial air campaign was the antithesis of decisive-oriented US Air Force aerospace doctrine.

Delay in Joint/Combined Targeting Approval and Guidance Process. It took four weeks of mismanaged combat operations to recoup the capability to nominate, weaponeer, approve, and incorporate target sets in a coordinated joint/combined planning and guidance process. Along with the consensus that Milosevic would capitulate quickly, four other issues factored into this delay: General Clark's comfort level with the initial target approval process; the absence of a senior airman advisor to SACEUR; the political interplay of target approval/disapproval; and the initial absence of a strategy/guidance, apportionment, and targeting (STRAT/GAT) cell at the CAOC.

SACEUR's Comfort Level. The initial VTCs between SACEUR, the JFC, CFACC, CMFCC, and other key players usurped the doctrinal model for target approval. Colonel Holland remembered:

SACEUR did not understand the targeting approval process. As airmen, we should have been pushing that forward with a package from the CAOC to SACEUR. I don't know what happened. We started off allowing SACEUR to have tactical control of everything. The first VTCs supported this preconceived notion of how the target approval process would work. Because of the preconceived notions, the first VTC started off reviewing the nuts and bolts of each individual target, and that's what drove us to be well within [preempting] the doctrinal planning cycle.[31]

The first VTC cemented SACEUR's comfort level with a doctrinally unsound target-

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SACEUR faced a pivotal problem: acquiesce to dissenting political desires of fickle NATO allies or risk damaging NATO cohesion by unleashing "punishment" attacks on Belgrade's population and leadership target sets.

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approval process. The result in the CAOC was a round-the-clock scramble to identify and plan short-notice targets, rapid construction of mistake-ridden ATOs, and tasking aircrews as they walked to their aircraft. The process debilitated the CAOC planning staffs and aircrews. Interdiction targets of little significance were hit repeatedly, while attacks on illusive enemy forces inside Kosovo proved difficult at best.*

Absence of Airman Advisor to SACEUR. Many blamed the faulty target-approval process on the notion that there was no assigned senior-level US or NATO air force airman vigorously advising SACEUR. In retrospect, Maj Gen Charles D. Link, USAF, Retired, suggested the lesson of Allied Force was the need to "place air campaigns in the hands of an 'Airman' commander. Put that

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*Author's note: As part of the CAOC warfighting staff, I recall that weather precluded many attacks on fielded forces in Kosovo. However, for the initial 40 days of the campaign, numerous insignificant targets were repeatedly bombed into rubble due to a lack of freshly approved target sets.

commander in direct dialogue with the political authorities so that his specialized competence can be brought to bear in the planning phase as well as the execution. Military means are appropriately subordinate to political ends, but political leaders deserve expert advice—direct from the airman's mouth."[32]

Many onlookers felt General Short should have been General Clark's senior air advisor. General Short described his perception of the problem:

> Look at the SHAPE [Supreme Headquarters Allied Powers Europe] staff. A U.S. Army four-star is SACEUR, a British Army four-star is Deputy SACEUR, and a German Army four-star is the Chief of Staff, until you get to the Air Force two-star. SACEUR had no air expertise. Not that the two-star isn't an expert, but you can't go head-to-head with a four-star. There was no air expertise at the appropriate level. General John Jumper [four-star Commander of U.S. Air Forces Europe], the senior airman in the theater was several layers removed and physically absent from SHAPE headquarters.[33]

Although General Jumper did assist SACEUR on numerous occasions, he was a supporting commander and not directly in the NATO chain of command. NATO officers at the CAOC felt the SHAPE structure overlooked the need for a senior airman advisor to SACEUR. Col Hans-Peter Koch of the German air force, one of several battle staff directors tasked with coordinating the real-time air strikes at the CAOC, believed "the biggest shortfall was that SACEUR did not have a NATO airman in his close proximity."[34]

Interplay of Politics on Target Appoval/ Disapproval. General Clark's comfort level with the VTC venue of target approval and the absence of an airman in his inner circle were not the only obstacles to a functioning target-guidance and approval process. Incremental target approval from selective NATO nations was a chronic problem. Politics thwarted the execution of Allied Force. Stephen Aubin correctly discerned

> that the military had been politically constrained right from the start. What seems clear is that the political leaders, especially those in

Washington, never intended to fight an all-out war. Military force was to be applied tentatively and in limited doses in support of continuing diplomatic initiatives.[35]

Indeed, a politically motivated and convoluted target-approval process meted out the tentative use of military force. General Short argued that the political interference in choosing targets was sanctioned at the highest US and NATO military levels:

> We went right back, from my perspective to 1968, where the President of the United States was approving targets. The Joint Staff drove this to an unacceptable degree. Targets were picked and turned down by the Joint Staff. Once Washington approved the target, you had to get it through the NATO North Atlantic Council (NAC). Then the targets had to go to the five Chairmen of Defense [members] (United Kingdom, Germany, Italy, France, and the U.S.). That's where each nation would weigh in.[36]

Doctrinally, the JFC and CFACC should have been allowed to recommend *block* target sets for *block* approval based on the desired effects mandated by the military objectives. Instead, the incremental target-approval process wreaked havoc on doctrinally supported synchronized air operations. Colonel Holland remarked that "targets were not available to the CAOC planning staff until approved through two chains: the U.S. and NAC. Target approval was piecemealed."[37] Worse, following US and NAC approval, targets were subject to scrutiny through the US European Command and the JTF staff in a trickle-down manner. The result was an incremental bombing campaign roughly framed around a phased strategy that lacked decisive effects. As Admiral Ellis concluded, "The political environment caused an 'incremental' war instead of decisive operations."[38]

NATO's fear of collateral damage exacerbated the target-approval quagmire. Four major collateral-damage events occurred during the air campaign: the AGM-130 rocket-powered bomb that hit a moving passenger train; the unintentional bombing of Kosovar refugees and the mistaken destruction of a

passenger bus; the inadvertent opening of a cluster bomb; and the mistaken bombing of the Chinese Embassy. All four instances of collateral damage threatened to fracture NATO cohesion and cause a halt to the air campaign. As Dana Priest of the *Washington Post* noted, "When bombs accidentally hit Albanian refugees or Serbian civilians, the international outcry was swift, and popular support for the war waned. So political leaders became deeply involved in the nitty-gritty of targeting decisions."[39] This meant tighter restrictions on the types of targets hit, narrowly specified types of bombs for certain targets, controlled timing of air strikes, restrictive avenues of approach for NATO aircraft, and an overall political micromanagement of the entire target approval process.

Initial Absence of a STRAT/GAT Cell at the CAOC. There was yet another obstacle in the 40-day delay in implementing a doctrinally aligned targeting approval process: the initial absence of a STRAT/GAT cell at the CAOC. On the first night of Allied Force bombing, the existing CAOC STRAT/GAT cell was manned with a temporary and untrained staff. As a result of CAOC senior leadership expectation for a short air victory, there was little forethought in establishing a doctrinally robust STRAT/GAT cell. General Short, schooled in CFACC staff requirements, recognized the deficiency:

> We were prepared to fly a few sorties and bomb them for a couple of nights. Here are your targets; don't think, just execute. I fault myself for waiting four weeks to stand up the STRAT/GAT cell. It made an incredible difference. I should've realized that's what was needed in the beginning.[40]

The absence of a robust STRAT/GAT cell had long-term effects on the unity of effort within the CAOC. Also, against sound airpower doctrine, the CFACC did not produce a daily air operations directive (AOD) outlining the apportionment and weight of effort for the air tasking order. Granted, the intense political interplay on target approval inhibited a clear sense of guidance for the first week of operations, but the JFC and CFACC

fell significantly behind in their obligation to formulate and transmit daily written guidance to planners and operators on the CAOC warfighting staff.

Effects of Dual ATOs. The lack of a doctrinally based joint/combined target-guidance and approval process caused undue difficulties as the CAOC tried to produce a timely and accurate ATO. The creation of two parallel ATOs, instead of a traditional centralized ATO, complicated an already frustrated and confused CAOC warfighting staff and violated the fundamental doctrine of unity of command.

The original purpose of a separate ATO stemmed from US desires to cloak (even from NATO) the use of stealth aircraft, and to control the use of cruise missiles. Colonel Koch concluded that the "dual ATO" process caused dangerous confusion:

> I could not manage the battle. I had aircraft which I did not know when they were to show up, what support they needed, and what route they were flying. We had several situations where some assets on the U.S.–only ATO were flying at the same time and in the same airspace as NATO assets executing air strikes. The secrecy of the U.S.–only ATO kept important information from the NATO battle staff. This was a major shortfall of the two ATOs. If you don't tell the battle managers whose [*sic*] flying, it's dangerous.[41]

As with the targeting-approval process, SACEUR reached a comfort level with the US Air Force–sponsored dual ATO process because he was shielded from the confusion. As a consequence, the doctrinally indecisive dual ATO shattered unity of command, created tactical and operational confusion, and caused an indecisive application of aerospace power.

Conclusion

Operation Allied Force was indicative of the debilitating influence of negative political objectives on positive military objectives. Additionally, faulty command structures, conflicting senior leadership dynamics, and a

lack of doctrinally sound target guidance and approval diluted the decisive application of airpower. The dual ATO system shattered all doctrinal notions of unity of command. General Clark conceded that "the air campaign was an effort to coerce, not to seize."[42] General Clark's admission suggests the broader need for airmen to understand that although airpower can be potentially decisive, in the larger context and frequency of nontraditional conflicts, airpower is most pragmatically a coercive tool seen as likely to be restricted by the politics of war and influenced by senior leaders' capacities to function efficiently within the complex combat environment. Pape dispels the assumption that "coercive punishment" would have been more effective than a "denial" campaign:

> The evidence shows that it is the threat of military failure, which I call denial, and not threats to civilians, which we may call punishment, which provides the critical leverage in conventional coercion. Consequently, coercion based on punishing civilians rarely succeeds. The key to success in conventional coercion is not punishment but denial, that is the ability to thwart the target state's military strategy for controlling the objectives in dispute.[43]

The coercive nature of Allied Force was, in effect, the most likely method for success. This suggestion is objectionable to airmen and is the antithesis of US Air Force aerospace-power doctrine. However, it is the probable reality for future conflicts.

Allied Force and the historic prerogatives of political objectives in war raise two questions: Should US Air Force aerospace-power doctrine be more coercively oriented? and Is the gradualistic application of aerospace power the norm for future conflicts?

The answer to the first question is an emphatic yes. US Air Force aerospace-power doctrine should be more coercively oriented than idealistically decisive. Coercive airpower is the most likely reality in future wars (outside of nuclear conflict). Allied Force is but one example where aerospace power was subjected to recurring, predictable, and legiti-

mate political constraints. Airpower is wholly an extension of coercive military force.

Current aerospace-power doctrine is a two-edged sword. One edge utilizes doctrine as a marketing tool to compete in the joint service arena for future military programs, while the other edge attempts to guide airmen in sound warfighting principles. The challenge is to minimize the marketing utility of doctrine and maximize the operational relevance to the warfighter.

Whether or not the gradualistic application of aerospace power in Allied Force serves as a template for future conflicts is more problematic. During an Eaker Institute forum on Allied Force, General Jumper endorsed the probability that gradualism may be the required strategy of future conflicts:

> From the air campaign planning point of view, it is always the neatest and tidiest when you can get a political consensus of the objective of a certain phase, and then go about achieving that objective with the freedom to act as you see militarily best. But that is not the situation we find ourselves in. We can rail against that, but it does no good. It is the politics of the moment that is going to dictate what we are able to do. . . . If the limit of that consensus means gradualism, then we are going to have to find a way to deal with a phased air campaign with gradual escalation. . . . We hope to be able to convince politicians that is not the best way to do it, but in some cases we are going to have to live with that situation.[44]

General Jumper is not alone in his recognition that gradualism may be the template for future air campaigns. Gen Joseph Ralston echoed this notion:

> In spite of what might indicate the success of a gradualism strategy, the U.S. Air Force no doubt will continue to maintain that the massive application of airpower will be more efficient and effective than gradual escalation. Yet when the political and tactical constraints imposed on air use are extensive and pervasive—and that trend seems more rather than less likely—then gradualism may be perceived as the only option.[45]

The US Air Force should focus on maximizing airpower responsiveness and efficiency

within the constraints of political gradualism. US Air Force aerospace-power doctrine should endorse a less idealistic decisive philosophy and favor a more rational and realistic view of the coercive use of airpower. The result of educating leaders on realistic coercive airpower application will be a smarter, more efficient, more rapid, and a more effective use of lethal aerospace power across the spectrum of conflict. □

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Waging War with Civilians

Asking the Unanswered Questions

LT COL LOURDES A. CASTILLO, USAF
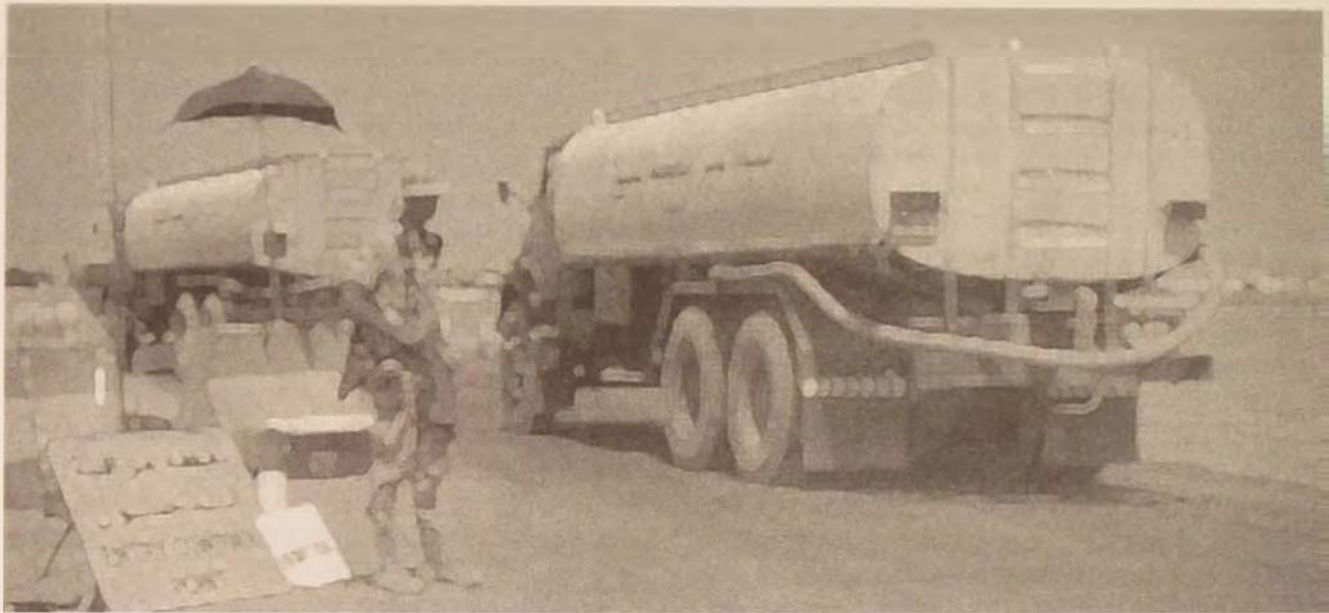
Editorial Abstract: When we properly consider war as Carl von Clausewitz did—as unique situations limited by numerous ambiguities— how can we possibly write a contract for war? Yet, this is one of the challenges that comes from using more and more privatization to save costs in increasingly technocomplex operations. As Lt Col Lourdes Castillo points out, contractors are no longer restricted to acquisition and logistics but are found nearly everywhere—and their presence on the battlefield is a reality. This article, originally submitted to our Spanish edition, opens up many important questions about doctrine, the chain of command, and legal issues. For other insightful articles on this topic and, in particular, Col Steven J. Zamparelli's "Contractors on the Battlefield: What Have We Signed Up For?" see Issues and Strategy 2000, a special issue of Air Force Journal of Logistics. Using contractors in war is a crucial subject on which our services absolutely must focus more attention.

SHOULD THE UNITED States consider using contractors to help the military wage war? This question no longer requires an answer. Contractors accompany the military into war zones and even into battle—that is a foregone conclusion. During the Gulf War, US contractors maintained equipment and provided technical expertise alongside deployed US military personnel; routinely flew on joint surveillance, target attack radar system aircraft;[1] and even moved into forward areas inside Iraq and Kuwait with combat forces.[2] Overall ninety-two hundred contractors and fifty-two hundred civilians deployed to support 541,000 military personnel.[3] During Operation Just Cause, 82 contractors deployed to Panama to support aviation assets.[4] In fact civilian contractors have quietly taken part in such recent and varied military-run operations as those in Somalia, Macedonia, and Rwanda, as well as those occasioned by Hurricanes Andrew and Iniki and numerous other domestic and international natural

disasters. They also have a long history of supporting the military. As far back as the Revolutionary War, Gen George Washington employed civilians to move and deliver military goods. Civilians performed logistics functions during both world wars, Korea, and Vietnam, as well as during most US-military-led humanitarian-aid missions.[5] Currently, contract employees provide food service and other base-support functions, both stateside and in front-line deployed locations throughout the world. They fulfill roles in construction, laundry service, security, communications, sanitation, and recreation, and work as maintainers and translators—and do so in steadily increasing numbers.[6] During Operations Desert Shield and Desert Storm, one in 50 Americans deployed in-theater was a civilian. By the time of the North Atlantic Treaty Organization's peacekeeping operation in Bosnia, that number had grown to one in 10.[7] The wave isn't coming—it's here. So today's pertinent question is, What is the best way to utilize contractors in combat? Although each of the US military services is actively trying to answer this extremely difficult, politically charged, and multifaceted question, the process produces many more questions than answers.

One must carefully examine such a dramatic change in fundamental military doctrine—replacing soldiers in combat with civilians—from every conceivable angle because the lives of America's fighting men and women are at stake. As was the case with the introduction of the tank and airplane into warfare, the emergence and development of any new military strategy of waging war bring with them new and unforeseeable dangers. According to Joint Publication 4-0, "Doctrine for Logistics Support of Joint Operations," "the warfighter's link to the contractor is through the contracting officer"—*not* the commander.[8] One can group the many risks associated with replacing soldiers, sailors, airmen, and marines with contractors into three main categories of questions: (1) How will using contractors affect mission accomplishment? Will it deter an opposing force, or will it create an easily identifiable Achilles' heel?

(2) Will using contractors extend the amount of time needed to complete the mission? Will American forces have to deploy at the slower pace of their contract support? Will the mission and the commander drive the tempo of decisions in battle, or will previously agreed upon contract limitations—which may not fit the current combat situation—act as the driving force? (3) Will using contractors place our service personnel at greater risk of losing their lives in combat?[9] Are we ultimately trading their blood to save a relatively insignificant amount in the national budget? We must completely and successfully answer these questions because if this grand experiment undertaken by our national leadership fails during wartime, the results will be unthinkable.

What has led the military to head down a path so potentially dangerous? The simple answer is money. Immense budgetary pressures from within and without the Department of Defense (DOD) demand more bang, not for the same, but for significantly fewer bucks. Since the end of the cold war, DOD has shrunk by over seven hundred thousand active duty military personnel, yet has deployed nearly five times more frequently.[10] Furthermore, DOD has cut over three hundred thousand of its civilians since 1989.[11] Military spending programs have undergone drastic cuts, funding for modernization has become increasingly competitive with other internal service programs, and military infrastructure and readiness have steadily declined since the previous decade. To solve these problems, Congress ordered DOD to develop ways of cutting costs without cutting services. In response, the military has had to turn to reengineering, competitive sourcing, and privatization of more and more military functions.

Is using contractors the right answer? What makes this option attractive? Again, the answer is money. According to Gen Bill Tuttle, US Army, Retired, president of Logistics Management Institute, based in Washington, D.C., the Army can cut logistics costs by up to 20 percent by using civilian contractors.[12] Although the amount of actual savings produced by privatizing support and logistics services is

debatable, even the most conservative estimates indicate that DOD can save a significant amount of its total obligation authority by contracting out most of its support functions and a large part of its logistics manpower.

In at least one area, using civilian contractors is more flexible than deploying service personnel into combat areas. When, during planning for the Bosnian peacekeeping operation, President Bill Clinton promised to limit the number of deployed troops to fewer than 20,000, his authority to deploy over two thousand additional civilians gave him the political flexibility to send in additional manpower to support the operational force.[13] Similarly, during the Vietnam War, President Lyndon Johnson avoided congressionally mandated troop ceilings by employing over 80,000 contractors during the most intense part of the war.[14] Regardless of the potential ethical questions of skirting US law by choosing to count involved civilians differently than uniformed war fighters, this option has the potential to utilize a larger combat force in a politically sensitive situation. Given the recent tendency of the United States to fight as part of a multinational coalition, this additional flexibility becomes important.

As this trend toward privatization increases in popularity, negotiating and working with a single contractor having a large number of employees should prove easier than managing many contractors having only a few employees each.[15] Today, the military services negotiate many small contracts yearly, but as DOD increases its expertise and becomes more familiar with both contractors and the contract process, it will naturally return to the familiar and the satisfactory. DOD will not rehire contractors who provide poor service but will send more government business to successful contractors. Finally, using contractors may make DOD eventually forget one of the military's steadfast rules: it takes eight years to gain eight years of experience. In terms of "growing your own" soldier, this is true, but DOD can hire contractors at whatever experience level it requires. If the Army, for example, needs to hire four hundred technicians

with 10 or more years of experience in maintaining rotary-wing aircraft, it can contract for exactly that. Contractors can provide expertise on a case-by-case basis, without the cost of training, housing, and paying individuals for the previous 10 years.[16]

What are the possible downsides of going to war with civilians? One of the most obvious is the loss of flexibility, one of the key tenets of successfully waging war. A commander's freedom and ability to improvise quickly in using tactics, employing weapons, and deploying personnel have long been considered essential to victory in combat. A contract—a legal, binding document—even when written with the best of intentions, cannot cover every possible contingency in advance. To stop during wartime, no matter how briefly, to rewrite or renegotiate a contractor's obligations severely limits a commander's ability to accomplish the mission. Writing contracts that take into account every possible aspect of the agreement will become extremely important and will eventually require every field commander to become an expert not only in the art of writing contracts, but also in contract law itself. Anything less will place both the commander and his or her command at risk.[17]

In past years, DOD took pains to make sure that the bulk of its weapon-system expertise remained based in either uniformed military personnel or DOD civilians. DOD Directive 1130.2, *Management and Control of Engineering and Technical Services*, now rescinded, required the military to quickly become proficient in maintaining and employing new systems, while limiting contractor support to just one year. In fact, Congress now *requires* contractor support for four years for new weapon systems and for the lifetime of noncritical systems.[18]

Many questions remain unanswered about how we will fight wars and use contractors in these new roles. Since contractors are legally classified as noncombatants, will they require protection by military forces, or will their presence drive changes to the internationally recognized—although not always followed—laws of armed conflict? This problem becomes especially difficult to solve when the threat is

nuclear, biological, and/or chemical. International law such as the Geneva Convention does recognize the necessity of civilians' support for combat forces but only in noncombatant roles that keep them out of direct engagement with enemy forces. Although the world community generally recognizes an international legal precedent for civilians to provide support during war, advances in weapon systems and changes in war-fighting strategies have blurred the lines between support and combat, combatant and noncombatant, and civilian and soldier.[19] An additional problem resides in the "no looking back" nature of contractor support, especially when it comes to military force structure. If, after a five- or 10-year trial period, the concept does not prove successful, the military will find itself unable to instantly grow, train, and benefit from the experience of the mid- and upper-level managers now developed within the enlisted and officer corps. It will take close to an entire career of 20 years before the military can regain the capability now resident in its personnel.

Other challenges also loom large. How will the military determine that contractors can meet their responsibilities, especially during peacetime? An inability to perform during wartime may become quickly and painfully apparent, but problems with contractor readiness may prove harder to detect prior to actually deploying into combat. Under current DOD directives, the military continuously monitors the readiness of its units for combat operations. The services' inspectors general and command-level oversight organizations make independent determinations about whether units are sufficiently manned, equipped, trained, and able to complete their missions. Will contractors have to agree to inspections that evaluate this same level of preparedness? Who will do these inspections, and how will they conduct them? What will happen when a contractor who receives an unsatisfactory rating challenges this finding in court?

How will the services' acquisition and logistics communities integrate contractor support in the theater of operations? Although contractor personnel do not fall under the operational chain of command of the commander in chief (CINC), coordination of contractor support and the flow of contractor materiel cause significant theater concerns and issues. The CINC is responsible for the flow of equipment, personnel, and materiel into the theater. The uncoordinated flow of contractor personnel and equipment competes for airframes, airfields, transportation, and road/raid networks both intra- and intertheater. Because these incoming shipments/personnel often arrive in-theater without the CINC's awareness, he or she loses the ability to plan and prioritize movement and distribution throughout the theater. This situation is a direct result of the gap between the acquisition and logistics communities. Currently, the services' program offices, materiel commands, and inventory-control points independently write logistics-support contracts without consideration for the integration of logistics support in the theater of operations.[20] Will we put in place a contractor-information system to give the theater CINC visibility and control over theater assets? How will we conduct strength accounting for civilians deployed in-theater? Will this become the responsibility of the current military-personnel function, which, like many other military career-field specialties, finds itself under scrutiny for competitive sourcing?

Will the services' contracting agencies write contracts flexible enough to allow for rapid mission changes, just as military units must allow for them? Also, after civilians receive assignments to a combat theater, what procedures will govern their rotation, and how will we handle transportation into and out of hostile-fire areas? Although the Joint Staff currently addresses this dilemma by including contractors in time-phased force and deployment data planning, this does not solve the problem.[21] For every contractor occupying a seat on a transport aircraft, one fewer soldier arrives in-theater. In addition, how does DOD Directive 1404.10, *Emergency-Essential (E-E) DOD U.S. Citizen Civilian Employees*, which

describes the assignment of E-E duties to DOD civilians, differentiate between traditional DOD employees and contracted civilians?[22]

After meeting the provisions of the US legal system, we may not solve many difficulties with having contractors provide combat support. If the United States continues to enter conflicts as a partner of a multinational force, it will have to observe international laws. How will our coalition partners in future conflicts react to our civilians serving alongside them on the battlefield? If they have an objection, will we honor it? We may have to negotiate new host-nation agreements for every specific operation.[23] If a host government of a sovereign state refuses to allow DOD contractors to enter the country because they are not military personnel, what options does the United States have? What if a contractor depends upon using local workers as part of its workforce—and the host nation refuses? Based on their standing as non-combatants, contractors may not receive protection under a host country's Status of Forces Agreement with the United States.[24] What provisions will Congress make for the pay and taxation of civilians serving in hostile-fire zones or other situations distinguished by special provisions regarding pay and/or allowances for military personnel? Will we have to establish a new category of pseudo-military taxpayer? What if the situational realities of a deployment make it impossible for a contractor to honor the terms of the contract? If a negotiated contract requires a contractor to arrange for commercial airlift into a theater, what happens if no commercial airlines can provide that service? What if no developed airfields exist and only military aircraft can reach the theater? Certainly, the US government cannot expect a contractor to honor contractual terms that prove impossible or even unreasonable. Also, what process will the two parties use to reach a mutual agreement that the terms of a contract are indeed impossible for the contractor to honor? Will contracted personnel have to provide for their own food, lodging, and medical treatment in-theater? Although DOD Instruction

3020.37, *Continuation of Essential DOD Contractor Services during Crises,* entitles contractors to the same medical care as the military while they remain in-theater, what liability does DOD have in areas with only the bare minimum of medical treatment?[25] We will have to answer these and many other questions, not only for each contract that DOD enters into, but also each time forces enter a combat zone.

Some of the most troubling questions concern chain of command and authority. In general, contractors are not subject to the same orders that apply to soldiers regarding good order and discipline.[26] Should they be? Will agreements negotiated in current contracts prove sufficient to meet the requirements of every possible future scenario? Legally, DOD cannot direct contractors to enter into a hostile-fire area unless Congress has formally declared war. One has to go back to World War II to find the last US declaration of war, despite the number of armed conflicts in which we have engaged over the last 50-plus years. We find DOD's current (but unsatisfactory) answer to this dilemma in DOD Instruction 3020.37, which states that the commander should find his or her own alternatives.[27] During the American Civil War, wagon drivers hired to deliver supplies to Army posts on the Western frontier became increasingly harder to find, so soldiers—who didn't have the option to quit—eventually replaced them.[28] Many people critical of the use of contractors also recall the infamous tree-cutting incident in Korea in 1976 that resulted in the death of an Army officer and upgraded our defense condition to level three. As a result, hundreds of Army civilians requested immediate transportation out of the Korean theater.[29] Will future contractors guarantee that their employees will not resign, quit, or request a transfer after assignment to a combat zone? What good will it do the US military to have a guarantee of "no stay, no pay"? Once the fighting starts, the objective is no longer to cut costs or save money but to accomplish the wartime mission. In days past, the local commander could routinely turn to his troops to perform tasks

other than their primary specialty when the work required relatively little skill or training. Given today's sophisticated weapon and support systems, however, turning to military members in times of contractor failure will become less of an option. This contingency, more than any other, might dominate battle planning for military commanders of the next generation.

What lies ahead for the US military? At what point do cost-saving measures begin to detract from mission effectiveness? Can we measure a cost-saving price against the life of a single US soldier? Will the current US legal system allow the presence of civilians in combat but prevent their suing the US government at every opportunity? Will the contractors' goal of making as much money as possible eventually conflict with the military's goal of accomplishing its mission? And what will be the long-term effect of having contractors work alongside service personnel? As far back as the Revolutionary War, soldiers could compare their salaries to those of civilians alongside them who engaged in logistics-support roles. Even then, disparities in wages and working conditions made it difficult to reenlist soldiers.[30]

The sheer size of contractors' support, their proximity to the battlefield, and the criticality of their contribution to mission accomplishment make this issue so important.[31] Cuts in both uniformed and DOD civilian personnel, government pressure to privatize or outsource work traditionally performed by the military, and a growing need for contractors to maintain increasingly sophisticated weapon, logistics, and communications systems have forced the military services to use contractors to accomplish the mission.[32] Using contractors on the battlefield seems the optimal solution to this difficult task—just ask any field commander. Hopefully, DOD will find solutions to the many unanswered questions before the next war. □

Notes

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Toward a History-Based Doctrine for Wargaming

Lt Col Matthew Caffrey Jr., USAFR

Editorial Abstract: While most human endeavors must deal with adversity or overcome opposition, warfare holds a unique place. When people decide to wage war against one another, they enter into a "zero-sum game" (for one side to win the other must lose) where the goals are quite literally as important as life and death. Given the stakes and uncertainties, it's not surprising that those who contemplate war developed an early and abiding interest in gaming possible outcomes. In reviewing the evolution of wargaming, Lieutenant Colonel Caffrey shows that it too has been impacted by the familiar factors of fog, friction, and chance—often in ways the game designers or sponsors did not intend or could not envision.

S ADLY, BOTH THE medical and military professions get to bury their mistakes. Because the cost of errors can be so high, student doctors are now using simulated patients to learn from their mistakes before treating real patients. For the same reason, the military has used wargames for centuries. Ever more powerful computers appear to promise increasingly more effective wargames. But will future wargames enlighten or mislead us?

Throughout history, wargaming has provided life-saving insights and dangerous mirages. If such mixed outcomes were random, there would be little use in studying the history of wargaming. However, history provides the raw material for anticipating cause and effect. By learning this history we will be able to devise ways to maximize the benefits of wargaming while minimizing its dangers. This history also provides insights into historic decisions and will suggest a connection between the spread of wargaming and of democracy. Finally, it's an interesting story.

What's in a Name?

First, what do we mean when we say "wargame"? The term *wargame* is simply a translation of the German *Kriegsspiel.* Unfor-

tunately, many in the military are simply uncomfortable with the term *wargame,* perhaps feeling that war is too serious to be a "game." This makes researching the history of wargaming challenging because wargames have been called by other names. These include "map maneuver," "chart maneuver," "field maneuver," "exercise," or increasingly, "modeling and simulation."
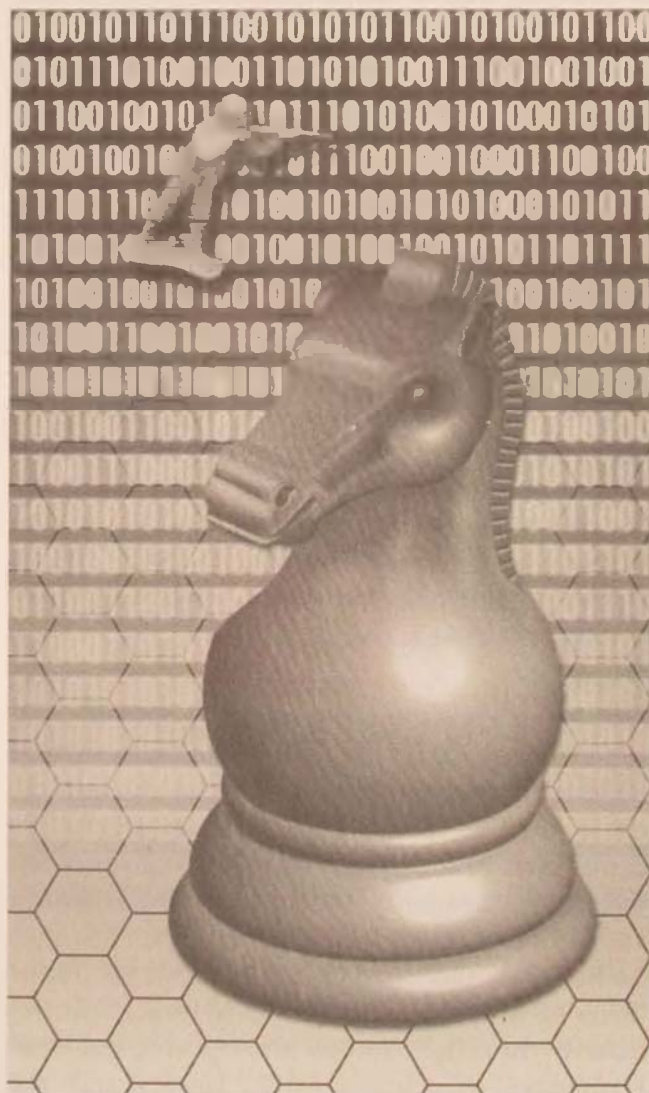
Some use the terms *modeling, simulation,* and *wargaming* as if they were one term, but they are distinct elements of wargaming. Models are simply proportional representations of reality. A painting is not a model, but a blueprint is. Models vary in abstraction; a physical model of an aircraft, a blueprint of that aircraft, and a mathematical equation representing that aircraft's characteristics are all models. Simulations are proportional representations of reality over time. For example, a small wing that is proportional to a full-sized wing is a model. Put that wing in a wind tunnel and measure the effect of various wind speeds and you have a simulation. As for wargames, while the earliest wargames were multisided abstract representations of combat, modern wargames require multiple sides that compete within a simulation of an armed conflict.[1]

An exercise may or may not also be a wargame depending on whether or not it fits the above criteria. Typically, the deciding factor is the presence or absence of a thinking opponent. Hence, a Red Flag exercise with its aggressor force is a wargame, while a mobility exercise is not.

In the Beginning

Wargames emerged among the rulers of all early civilizations.[2] Cultures separated by thousands of miles and hundreds of years felt the same necessity to prepare their future rulers to outthink other rulers. Though games like "Go" and chess are abstract depictions of war, they did (and do) teach "downboard" thinking; that is, anticipating the consequences of one's possible moves and the opponent's possible responses, an essential skill in the deadly game of war.

1664–1800: On the Brink

As the modern era dawned, there was an acceleration of changes that would impact and be impacted by wargaming. Maps grew more accurate[3] and chess[4] grew less abstract. In late 1781, John Clerk, a Scotsman, developed a method of using model ships to gain tactical insights.[5] He used his ships to step through battles, analyzing the influence the geometry of the combatants had on their combat power. While a military simulation, Clerk's work was not a wargame.

Yet, fundamental changes in society would soon produce fundamental changes in wargaming. In America, Benjamin Franklin had the audacity to say that all men should play chess, as it would help them learn how to look after their own defense. In Europe, Voltaire also encouraged the common people to play chess. The nobility was scandalized. If mere commoners played chess, where could it lead? Well, such thinking was typical of that which led to the French Revolution and to the rise of Napoléon Bonaparte.

Today we think of Napoléon as a great military genius,[6] but other factors also played a part in his military success. One factor was that the French Revolution produced a meritocracy. Previously, only children of officers could become officers. Now, half of Napoléon's marshals had once been common soldiers. Also, a democracy could field a far larger army then a similar-sized monarchy. Genius, meritocracy, and numbers—Prussia would invent modern wargaming while endeavoring, successfully, to overcome all these French advantages.

1811–24: The Birth of Modern Wargaming

Modern wargames were ushered in by a Prussian named Baron von Reisswitz,[7] the Prussian war counselor at Breslau. In 1811, he invented an innovative wargame. First, he constructed a table model of actual terrain. He then used blocks to represent units. Each player would give orders to an umpire, who

was required to update the terrain table, resolve combat, and tell the players only what they would know at that point in an actual situation. To determine casualties, umpires first consulted complex tables that indicated likely attrition based on range, terrain, and other factors. The exact attrition was determined by a roll of the dice, which depicted the uncertainties of the battlefield!

Arguably, not since Johannes Gutenberg's invention of the movable-type printing press had one man made so many interlocking breakthroughs at the same time. Yet, many historians do not credit Reisswitz with initiating modern wargaming. Why not? Because for all its innovation, Prussia used Reisswitz's invention in the same old way—educating princes in war.

But times were changing. To counter Napoléon's advantage in numbers, the crowned heads of Europe turned to nationalism. Even after defeating Napoléon, dynastic rivalries encouraged—and the industrial revolution permitted—armies to continue to grow. Prussia soon found it had too many soldiers for only the sons of officers to command. Faced with this officer shortage, even conservative Prussia began allowing the sons of mere bankers, industrialists, and government officials to become officers.

One of these new officers was Reisswitz's son, Lt George H. R. J. von Reisswitz, who soon realized that he and his fellow "outsiders" simply did not know as much about war as those who had been taught it at their father's knee. He believed *his* father's game could help. In 1824 he adapted his father's game so it could be played on topographical maps. At a stroke, he made wargaming cheaper, more convenient (unlike a sand table, a map could be rolled up), and more flexible.

The younger Reisswitz soon demonstrated his innovation to the Prussian chief of staff, Gen Karl von Muffling. After initially being bored and skeptical, Muffling became increasingly excited. Finally, he exclaimed, "It's not a game at all, it's training for war. I shall recommend it enthusiastically to the whole

army." Actually, he soon ordered all garrisons to conduct wargames.

This was the beginning of the young lieutenant's problems. His fellow officers resented the time these cumbersome wargames required. Finding his isolation intolerable, he took his own life in 1827.

1825–71: *Wargaming Comes of Age*

Of course, not all officers hated wargaming. As early as 1828, Lt Helmuth von Moltke advocated the use of wargames.[8] He even founded the Magdeburg (Wargaming) Club.[9] In 1837, now as *General* von Moltke, he became chief of staff of the Prussian army and ordered an increased use of wargaming. Although he met initial resistance, Moltke understood what motivated his subordinates and he soon devised a strategy to increase the use of wargaming.

While Prussia had used nationalism to overcome France's advantage in recruiting, it found that adopting a meritocracy was more difficult. Prussia's solution was to pair commanders selected for their nobility with chiefs of staff selected by merit. Because the only chance even members of the petty nobility had of attaining high rank was selection for the staff corps, virtually all officers wanted to be selected. However, only graduates of the War College were eligible. Moltke now required that each application package include a letter from the applicant's commander, evaluating his performance as the senior umpire for a wargame. It worked.

When the successful applicants became War College students, Moltke saw to it that they did a great deal more wargaming. Wargaming appears to have always been part of the curriculum at the War College, but Moltke added several innovations collectively called the "staff ride."

Periodically, Moltke would take the entire student body of the War College to one of the actual invasion corridors into Prussia. Moltke would then describe the most likely first clash between invading and Prussian forces. He would then turn to the most junior student present and ask for his plan of battle. Next he

would ask the second most junior, then the third, and so on. Why? If the most senior spoke first, would any disagree?[10]

After arriving at a consensus battle plan, they then played a map-based wargame. Moltke would then name the senior ranking general (aside from himself)[11] to command the invading forces and the second-ranking general to command the Prussian forces. He continued thusly until they were split into two equal teams. Why? Moltke believed that if their plan could succeed against some of their smartest strategists, it would probably also succeed against any enemy strategist. Also, with two equal-sized teams, more officers could participate meaningfully. The next day, he would contact the local garrison (remember the staff ride was being conducted in an actual invasion corridor, so there would always be a garrison). He would direct the garrison commander to march a few hundred soldiers where the plan called for thousands to march. This was done to test the marching times and other details of the plan. When all this was done, the plan went on the shelf as the *actual* plan for an invasion along that corridor.

Now let us think about all this for a minute. Moltke started with an "off site" (to an environment conducive to candor and free thinking), had a team brainstorm to reach a consensus, tested the resulting plan against a world-class adversary, and finally tested the results with a field exercise. Essentially, he used many smart people and effective procedures to create a plan worthy of a genius, eliminating Napoléon's final advantage of genius. With all our technology, are we really this conceptually sophisticated today?

1872–1913: Wargaming Becomes Global

Oddly enough, Moltke and Prussia won a series of wars, usually against opponents with larger forces that were technologically equivalent. Not surprisingly, the rest of the world started copying Prussia's (now Germany's) wargaming methods.[12] While there were local variations, the pattern was strikingly similar. A

young officer would translate German manuals, often improving some aspect in the process. He would meet initial opposition, but in time the use of wargames became institutionalized.

1776–1912: Coming to America

Like so much about America, our wargaming is partially home grown and partially acquired from other nations. Most observers credit Maj W. R. Livermore of the Corps of Engineers with bringing modern wargaming to America.[13] In 1883, Livermore freely admitted he started by simply translating German rules. However, he then went on to compare their attrition tables to actual statistics from the American Civil War and Prussia's own wars in 1866 and 1870–71. He found that the German attrition tables usually predicted lower casualties than the historical record indicated, and he adjusted his tables accordingly.

Despite this historical foundation, when Major Livermore sought official acceptance of wargaming, he was blocked by Gen William T. Sherman, the US Army's chief of staff at that time. He disapproved Major Livermore's proposals, stating that wargames depict men as if they were blocks of wood rather than human beings who are seized by fear and sustained by leadership.[14] His basic objection was that Major Livermore's wargame, like all up to that time, only depicted attrition as units fighting to the last man. Sherman knew better.

While one living legend blocked wargaming in the Army, another was advancing it in the Navy. William McCarty Little was one of those historical anomalies who shaped the world far more than rank or title would suggest. He had been medically retired for dubious cause in the middle of a promising naval career. Instead of being bitter, he went on to help found the Naval War College and to father naval wargaming in America. For years he did so as a volunteer, receiving no pay beyond his retirement stipend.[15] In 1887, he wrote and delivered the first lecture on wargaming given to an audience of professionals in the United States. While he drew on his conversations with Major Livermore and

the writings of Capt Sir John Phillips Colomb of the Royal Navy,[16] many of the insights were his own. Also in 1887, he and Major Livermore conducted the first joint Army–Navy wargaming field exercise. The Army high command promptly forbade any future joint exercises. In 1889, McCarty Little ran a wargame at the Naval War College, and wargames have been conducted there every year since then.

McCarty Little's selfless labors gradually paid off. As early as 1894 and 1896, wargames influenced the Navy's budget.[17] In 1895, a wargame played a decisive role in convincing Congress to fund the Cape Cod Canal. In 1899, the Army established a war college, and McCarty Little did what he could to ensure that its curriculum included wargaming. It has done so from 1899 to the present day. Soon the Army began innovation, turning to transparent overlays instead of blocks so that a permanent record of each move could be made. Also, to standardize the input of moves to the umpire, they devised a format for an operations order.[18] It was the father of the joint format still used today and of map overlays.[19]

While success was gradual, we can use a remarkable 1912 article in the US Naval Institute *Proceedings* to declare victory.[20] In this visionary article, McCarty Little describes concepts that are considered new today. He argued that wargaming had shaped and should continue to shape national policy; that it was the cure for peacetime "stove-pipe" mentality; and that it could not only produce better plans but could condition its practitioners to think and react quicker then their enemy, and hence gain an important advantage.[21] The clarity, persuasiveness, and confidence of this remarkable article clearly indicated wargaming had come to America—and like earlier immigrants had truly become American.

1872–1905: German Wargaming, Innovation, and Decline

While wargaming was spreading throughout the world, it was not standing still in Germany. Unfortunately for that country, not all of wargaming's movement was in a forward direction.

The combat experience that Prussia/Germany gained during their wars of unification had a powerful influence on their wargaming. Sherman could have told them one of the first things they had to learn: Units do not fight to the last man. In 1877, a Saxon captain named Naumann published rules to cover what today we would call "break points"; that is, the rules provided criteria for determining at what casualty level units would cease functioning.[22]

The second innovation came to be called *Free Kriegsspiel*.[23] A series of books published between 1873 and 1876 argued persuasively for a radically different type of wargame. The concept was simple. Wargames have always been unpopular due to the cumbersome, time-consuming rules of adjudication. Therefore, combat-experienced officers were allowed to substitute their military judgment for many of these rules. This would result in games that were faster and thus more popular, hence played more often.

At first, *Free Kriegsspiel* seemed to work well. At its best, the professional judgment of experienced combat veterans could produce more accurate outcomes in less time. There were two problems, however. First, Germany's veterans of 1871 gradually aged, retired, and died. Their replacements could not adjudicate with the same authority. The second problem is today called "command influence." When one of the players outranked the umpire, that player tended to value his professional judgment over that of the umpire.

Nowhere was this problem more visible or more damaging than in the case of Kaiser Wilhelm II.[24] Thinking himself a great military genius, Kaiser Wilhelm never missed a staff ride. The rides still started on a hill overlooking a possible invasion corridor. Just when Moltke would have asked the most junior officer for his opinion, the kaiser would immediately announce the "perfect" battle plan. You can imagine the level of debate. Then, during the actual wargame, instead of having the teams split evenly, everyone wanted to be on the kaiser's team. The results

were predictable; the kaiser's side always won. It was Germany's loss.

1890s–1913: The Birth of Second-Generation Civilian Wargames

While many of the citizens of the Western democracies had played chess since the time of Franklin and Voltaire, they had missed out on the second generation of simulation wargames initiated by Reisswitz.[25] Perhaps not surprisingly, the "technology transfer" that led to the civilization of wargaming started with a couple of reservists—one British, one German.

British gaming at war college, 1898

Spenser Wilkinson began his crusade while still attending college. In 1873, while on summer vacation in Germany, he was glancing through a pamphlet about the military balance and was shocked to learn that Britain's army was among Europe's smallest. Among his many initiatives, Wilkinson organized England's first wargaming club.[26] Presumably through Wilkinson's efforts, one member of Parliament in 1900 listed wargaming as a hobby.[27]

The German reservist's contribution to civilian wargaming was more indirect. Civilians had to be motivated to study war before they could become interested in complex simulation wargames. Hans Delbrück provided that motivation. His family had advised Prussian kings on matters of war for generations. He wrote that "it was vital that the king understood war for it is on the outcomes of war that the nation prospers or dies. Now Germany is evolving toward a democracy, the people are becoming the sovereign, and it is just as important that they understand war." To help the people study war, he became the foremost military historian of his time.[28] A prolific and influential author, he founded the first chair of military history at a civilian university and edited the first defense affairs journal aimed at a civilian audience.[29] Interestingly, both the first modern naval and land wargames intended for a civilian audience were published in England.

The first publication detailed rules for naval battles that required very detailed ship profiles. Data on only four ships were included with the game, and customers were soon clamoring for more. A game supplement with the needed profiles for all British ships soon followed. Still, playing a wargame between British ships was a little like kissing one's sister. His next offering provided the needed data for the entire German navy. There was an uproar in the press—"The Germans are our friends"; "How dare he imply our navies may someday fight!" To avoid singling out any one nation, Fred Jane next published *Jane's All the World's Fighting Ships*. So the entire Jane group that has contributed so much to the reference sections of libraries and to the British balance of payments started with a wargame.

Finally, a ground combat simulation wargame was published for civilian use. The author's avowed purpose in designing the wargame was to help civilians better understand how terrible war was. He predicted that if the people of democracies truly understood how terrible war was they would make sure their governments would never again start one. While the author, H. G. Wells, made many correct predictions in his long career, this one was, at best, premature. His book of rules, called *Little Wars*, was published in 1913.

While both works were fairly popular, the number of civilians playing simulation wargames would remain modest for many decades. The fairly complex rules deterred some, but the main problem was the cost of

Naval simulation with game pieces at the Naval War College, Newport, Rhode Island

the metal soldiers or ships. Only the well-to-do could afford full sets of such miniatures around the turn of the last century. Still, this is not to say early civilian simulation wargames did not have an impact. One young British aristocrat enjoyed wargaming with miniatures well into his adult years—his name, Winston Churchill.

1905–18: Wargaming and the Great War

Arguably the most decisive wargames of all time were played in 1905. That was the only year Count Alfred von Schlieffen's plan for a wide-turning movement through neutral Belgium and Holland was wargamed before his retirement. Virtually all present were on the kaiser's (German) team, while two first lieutenants played on the side of the armies of France, Britain, Belgium, and Holland. The wargame concluded with the destruction of the French army so quickly that the British did not have time to come to the aid of France.[30] The kaiser was pleased.

In the same year, at Wilkinson's urging, the British played a wargame examining the consequences of a new war between Germany and France. The British game also envisioned a German turning movement through Belgium. Like the German wargame, the British game also indicated that the Germans would destroy the French army before a British Expeditionary Force (BEF) could intervene. Wilkinson and his colleagues were not nearly so pleased with that outcome. This wargame led to a host of actions, in no small part due to Wilkinson's ensuring that the results of the wargame came up on the floor of Parliament. Repercussions ranged from reworking mobilization and cross-channel plans to informal staff talks with the French.[31]

Ironically, British wargaming was short-lived. Wargames dropped in popularity as it became evident that wargames of the period

could not address the psychological and political dimensions of the Boer War.[32] Still, as the Germans lost the key first campaign of World War I because the BEF was in the wrong place at the right time, the impact of Britain's brief flirtation with wargaming on world history would be hard to exaggerate.

One wargame that did not shape history, but should have, took place in Saint Petersburg, Russia, in April 1914.[33] The same two generals who would command Russia's two most modern armies in the event of war directed the Russian side in the wargame. Both Russian armies advanced into East Prussia against little opposition. When the Russian armies entered an area of lakes that made cooperation between the armies difficult, the players for the German side placed a thin screening force in front of the Russian army to the north, then shifted the bulk of their forces to surround and destroy the Russian army in the south.[34]

Just four months later, the same two Russian generals commanding the same two armies implemented what appears to be the exact same plan. Once again, both armies made good initial progress. Once again, they reached the area of lakes that made cooperation between the armies difficult. Now the real Germans placed a light screening force in front of Russia's northern army and shifted the bulk of their forces to surround and destroy Russia's southern army—near the town of Tannenberg. The lessons learned in the wargame had been completely ignored.

In Germany in the decade before the First World War, something of a wargaming renaissance was under way due to Helmuth von Moltke the Younger (the nephew of the great Moltke). This Moltke has received much abuse over the years for "ruining" Schlieffen's master plan. While the wisdom of decisions he made during execution can at best be called debatable, he clearly did much to improve planning methods before the war.[35]

The younger Moltke started by going to the kaiser, a childhood friend (thanks to his famous uncle). He privately told the kaiser that the latter's strategizing during the staff rides was closing off rigorous debate. The kaiser agreed to desist.

Next, Moltke examined the wargames themselves. When he discovered that the effect of machine guns on the games was not being considered, he was told there was insufficient data to precisely predict their impact on attrition. Moltke saw to it that data acquired from the Russo-Japanese War could be used. He then asked why logistics were not being included. When told that wargames could not account for logistics, he pointed out that the Italian wargames had included logistics for decades.

Moltke then used his more objective and comprehensive wargame to test the Schlieffen plan. The game indicated that the two armies on the outside of the great wheel would run out of ammunition two days *before* the campaign ended. Moltke saw to it that Germany organized the first two motorized units of any army anywhere in the world—two ammunition supply battalions.

Of course, when war came, the plan did not work as well as the Germans hoped. Why not? Moltke's efforts to make the wargames more fully depict contemporary combat results did produce positive effects in that Germany was relatively less surprised by the nature of the early fighting. What got Germany into trouble was not what the Germans wargamed wrong but what they failed to wargame.

They did not simulate the diplomatic and political consequences of their actions. Spontaneous efforts by Belgian civilians to destroy their own railroads caught the Germans by surprise. There were no such contingencies in German wargames. Even more serious, they did not simulate the diplomatic consequences of invading Belgium. The invasion of that country brought the British Empire into the war,[36] the British were eventually influential in bringing in the United States, and the additional weight of US force ultimately defeated Germany. The Germans got most of the details right, but their wargames failed to adjudicate the most decisive consequences of their invasion of Belgium—the political consequences.

These consequences were also ignored when Germany conducted wargames prior to each of its 1918 "peace offensives." Germany had a "window of opportunity" when its recent victory over Russia had freed up a great many forces, and few Americans forces were yet on the Continent. But if these offensives failed, Germany's prospects were bleak. While they achieved spectacular advances by World War I standards, these offensives did not reach any truly strategic objectives and hence ultimately failed.

Delbrück, writing in his defense journal during the war, criticized the General Staff. He stated that the wargames had roughly predicted the indecisive outcomes that took place—yet the General Staff went ahead. He claimed that if representatives of the Foreign Ministry had been present at the wargames, they would have realized that the initial advances would have caused panic in Allied capitals. He claimed that if Germany had offered generous peace terms before the offensives had lost momentum (returning most of Belgium, for example), the offer might have been accepted. Now Delbrück feared Germany could not get such peace terms.[37] He was right.

1919–38: Interwar Wargaming: The Visionary and the Blind

Delbrück may have had a hand in bringing about the most sophisticated wargaming of the interwar or any other period. Delbrück testified before a government panel that poor grand strategy was the root cause of Germany's defeat, and the General Staff's purely military analysis of war plans was a cause of this poor grand strategy. Their wargames could only show the attrition effects of invading neutral Belgium or conducting unrestricted submarine warfare. They could not predict the political effects of these actions or the subsequent military consequences.

The German government soon established strategic-level wargames, not at the shadow general staff level but at the Ministry of Defense.[38] These wargames were truly compre-

hensive, with industrialists brought in to advise on the speed of industrial mobilization, attachés brought back from their assigned countries to play their countries' militaries realistically, and diplomats integrating their actions with the militaries. Even journalists participated, commenting on likely world public opinion.

Limited to a skeletal military, Germany could still wargame with forces it did not yet possess. In addition, the Germans took an extremely pragmatic and detailed look at the history of the war. From this history they derived theories about what would and would not work in future wars. As the theories were rigorously compared to the historical facts, a new doctrine began to emerge. In turn, this doctrine was rigorously tested in wargames—all with forces that did not physically exist. The Germans called the concept they developed "mobile operations"; the rest of the world would soon call it *Blitzkrieg*.

Germany's World War II preeminence in armor is all the more remarkable because at the end of World War I, the United Kingdom had the world's most potent armored force. Britain also produced the interwar period's most prominent armor theorists, J. F. C. Fuller and B. H. Liddell Hart. How did Britain fall so far behind? While many factors worked against the development of British armor, wargames that did not reflect the tank's true value appear to have played a crucial role.[39]

Although it did not reach the depths of British wargaming during the interwar period, US Army wargaming also reached a low point during that time. Little is written or known about it, and all that is known is bad.[40] Perhaps due to the malaise born of slow promotions and low budgets, most Army wargames stopped being wargames and instead became one-sided scripted exercises. The outcome was always the same regardless of brilliance or stupidity, diligence or laziness of the participants.

Some true wargaming did survive both at the Army's staff and war colleges and in the field, though here there were problems. In

1934, six faculty members of the Air Corps Tactical School (ACTS), Maxwell Field, Alabama, including Maj Claire L. Chennault, were called to testify before a commission on the Army's use of airpower.[41] They were originally told that they would have to pay their own way, as the Army had insufficient funds to pay for their travel. At the hearings, Chennault stated that during Army field maneuvers airpower had not been allowed to attack enemy forces before, during, or after amphibious landings but was only used in close support after trench lines had formed. The Army's response was that their learning objective was to practice trench warfare. If airpower were used too soon, the trench lines might not form.

Chennault argued that these wargames needed to include airpower precisely because airpower would prevent World War I trench systems from forming. If the Army did not learn how to fight the more mobile style of future war through wargaming, it would have to learn those lessons at a far higher cost on actual battlefields.

When Chennault returned from testifying, he was informed that his orders to attend the Army's Command and General Staff College (CGSC) were canceled.[42] Not seeing a chance for advancement without attending CGSC, Chennault left the service.

This was *not* an isolated incident. The faculty of the Air Corps Tactical School participated in Army War College (AWC) annual wargames, starting in 1923, hoping to educate senior Army officers in the doctrinal use of airpower.[43] The results were uniformly disappointing. Despite the gradual inclusion of air officers in the planning process, AWC restricted air participation to activities in the combat zone and not against vulnerable enemy rear-area targets. The artificial nature of the depiction of airpower disgusted the ACTS participants and may have actually been negative training for the Army's future leaders.

Things were not perfect in the Army's air arm, either. At Maxwell Field, ACTS was evolving the doctrine and educating the airpower leaders for fighting World War II. On the surface, their teaching methods appeared outstanding. Periodically, the students would apply what they learned by writing a plan to attack a real target. The faculty would then pick one of these plans and the entire student body would climb into aircraft and execute the plan. Not since Moltke's staff rides did planning receive such a fast real-world confirmation. There was just one problem: ACTS was simulating actual missions; they were not wargaming them. The bombers always got through to Selma, which was to be "bombed," as there was no enemy resistance. One can guess how this caused doctrine to evolve, or more likely not to evolve.[44]

There was one bright spot. In 1929, a young captain named George Kenney recognized the need for airmen to understand how airpower fit into overall theater campaigns. On his own initiative, he developed an air/sea/land wargame that took maintenance, supply, and even airfield construction into account. Student feedback to his wargame was mixed. Immediately after execution, the wargame received a lot of criticism for being difficult to play. However, it was rated much higher in graduation surveys.[45]

Unfortunately, the wargame was so complex and cumbersome that after Kenney's departure in 1932, no other faculty member was willing to take it over. How much impact could such a short-lived wargame have? Many historians believe General Kenney was the prime architect of Gen Douglas MacArthur's Southwest Pacific air, sea, and land campaign in that theater. How much impact, indeed?

Clearly, the wargaming success story of the interwar period is that of the US Navy. Both the fleet and the Marine Corps made impressive use of wargaming, with a positive impact that has seldom been equaled.

The Navy built upon the work of McCarty Little, continually refining his technique. Even before World War I, the bulk of their wargames began looking at a possible war with Japan. Initially, all wargames assumed that the American fleet would dash across the Pacific, fight and win a big climactic battle, and relieve the Philippines. However, as the

Naval War College refined its methods, the logistical constraints on such a rapid advance became obvious. Soon the wargames also made clear the need for forward bases in such a campaign. As understanding increased, the time needed for the advance grew from days to months to years.[46]

Other elements were less clear. All through this period, US intelligence on the specific characteristics of Japanese weapons and of troop training levels was atrocious. Instead of arguing over what they did not know, the Navy turned this handicap into an advantage. How they did it shows their keen insight into education and human nature.

Naval War College students certainly wanted to win their big "capstone" wargame at the end of their school year.[47] As students have always done, they asked those who graduated before them for advice, or in the vernacular of the US military, "gouge." Graduates were happy to provide advice: "Try to engage the Japanese at night, they are blind; watch out for their torpedoes though, they are killers; fortunately, though, their ships sink like rocks after the lightest of battering." However, when they talked to someone who graduated in a different year, they learned "Avoid night engagements, the Japs are incredible; and their ships are so rugged they can really close in and slug it out; at least you don't have to worry about their tinker toy torpedoes." Slowly it dawned on the students—the faculty was giving the Japanese different strengths and weaknesses in each wargame!

What were the students to do? Unable to simply learn Japanese strengths and weaknesses before the game, they had to play the game in such a way that they could learn them through experience before any decisive engagements took place. Once they learned what those strengths and weaknesses were, they would then develop a strategy to put US strengths against Japanese weaknesses while protecting our weaknesses from Japanese strengths. They could then force the decisive engagements. In other words, they were "learning how to learn."

This by itself was a breakthrough, but the Navy's wargamers did more. Despite the Navy of this period being influenced by battleship admirals, the Navy's aviation community was able to develop operational concepts and procedures that were ready to be implemented when, at Pearl Harbor, the Japanese took away our option for battleship tactics. How did they do it? The Navy was able to use wargames to cheaply, quickly, and educationally try out different ideas in aviation and even ship design. For example, the circular formation used during World War II by carrier task forces was first developed during an interwar wargame. Some of what was learned resulted in changes in ships already under construction.[48]

The United States Marine Corps carried out arguably the most important wargaming work done during this period. The Naval War College's wargames had shown the importance of forward bases in any war with Japan, yet World War I had seemed to show that amphibious assaults were problematic against modern weapons.

So the Marines had to solve an enduring problem, and they had to do so despite one of their traditional handicaps—a very sparse budget. Wargaming was the key.[49] Through both map wargames and live wargame exercises, they developed their doctrine of amphibious operations. They set out to make an offensive against Japan sustainable, yet what they really developed was the key to Allied success in all theaters. D day and victory in Europe would have been impossible without the work done by the USMC during the 1930s—with almost no budget and all too little recognition, then or now.[50]

1933–41: The Storm Builds

It can be argued that the most potentially decisive wargames of World War II were never played. When Adolf Hitler came to power, he quickly put a stop to the strategic-level wargames. He would make the future strategic decisions for Germany. During the war, Germany fought smart at the operational

level, yet made poor decisions at the strategic level.

Would strategic wargames have influenced Hitler's decisions? Perhaps not. In 1938, Gen Ludwig Beck, then chief of the German General Staff, conducted a wargame of a German campaign against Czechoslovakia. While the wargame predicted a German victory, it also predicted that the fight would critically weaken Germany.[51] Hitler ignored these findings, as he believed the Czechs would not fight.

Still, 1940 wargames conducted by the then obscure Lt Gen Erich von Manstein seemed to convince Hitler to order the bolder plan.[52] The result was a French defeat far faster and more complete than would have otherwise been possible. Wargames could also discourage. For example, one game of an air campaign against Britain and a second on a cross-channel invasion both predicted difficulties. When the actual Battle of Britain proved indecisive, the predictions of the cross-channel invasion wargame were taken even more seriously.[53]

Hence, a wargame predicting disaster in an attack on the Soviet Union may have had some effect. Such a wargame, Operation Otto, was conducted in three separate sessions.[54] At the end of the unprecedented third session, the wargame had been played only through to early November, yet no fourth session was scheduled. One reason was that the wargame predicted the destruction of 240 Soviet divisions, with only 60 remaining on a front line deep in the Soviet Union. Surely the Soviets could not recover.

Ironically, in the actual campaign on the actual "date" that Operation Otto ended, the Germans had advanced about as far as predicted by the wargame and had actually destroyed more Soviet divisions (248). However, instead of the Soviets being down to 60 divisions, they still had 220 divisions. How could the wargame be so wrong? The Soviets had mobilized entire new divisions upon the beginning of hostilities. To make matters worse, after the time period wargamed (early November), the Soviets acquired an old ally—

winter. German forces were woefully unprepared for winter fighting. Would a fourth session of Operation Otto have prompted preparation?

The Red Army also wargamed a German invasion.[55] Joseph Stalin's "displeasure" at the depth of the German advance in the wargame may help explain the premature counterattacks made in the actual invasion. Stalin conceded that one of the reasons the Red Army did so poorly was that the young general playing the German side of the wargame had played brilliantly. This general's name was Georgy Zhukov.

At the same time these wargames were being played, the US Army was increasing the rigor of its wargaming. One reason was the Army's new chief of staff, Gen George C. Marshall. Like Moltke, Marshall had liked wargames from the time he was a junior officer. Now, with the likelihood of war growing, he turned principally to the field exercise type of wargames.

Of these, the Louisiana maneuvers are best remembered.[56] While live play increased realism, especially in unit movement, combat used systems of adjudication very similar to map wargames. Because much equipment was new, the wargame could only be as accurate as the guesses about effectiveness.

There were some honest mistakes. The head of the tank-destroyer program provided the adjudication guide for the effectiveness of tank destroyers. Later events would show these guides overstated their lethality. But until then, these exercises "proved" their effectiveness. As a result, in early battles tank destroyers were used too aggressively—with tragic results.[57]

Other flaws in adjudication were deliberate.[58] Efforts were made before play ever began to guarantee an outcome that would "prove" the ground officers' position on the employment of airpower. As a result, the ground officers' air concept prevailed.[59] Procedures were not changed until tragedies like the battle at Kasserine Pass demonstrated the need to do so.[60]

The Japanese also used wargames. In August 1941, Japan's Total War Research Institute conducted a global political military wargame.[61] Paying close attention to the politics within target, neutral, and friendly countries, this wargame (which did *not* include an attack on Pearl Harbor) predicted an Axis victory and may have encouraged Japanese entry into the war. After the decision for war, each service wargamed its planned operations. These wargames could predict relative attrition with greater precision, but they did *not* include political considerations.

Japanese model of Pearl Harbor, 1940. Note the battleship row placed next to Ford Island.

Some historians have maintained that Japan's wargaming of the attack on Pearl Harbor demonstrates how wargaming should be done.[62] Japan originally planned to sail her carrier force from its normal base straight toward Pearl Harbor. During the wargame, the Japanese officers playing the American role used their limited sea surveillance assets to search for and find the Japanese force while it was still well out to sea. The Japanese side did "win" (i.e., they sank more ships than they lost), but it was a Pyrrhic victory that Japan could ill afford at the beginning of a long war against an industrially stronger nation. So the Japanese planners went back to their planning cell and came up with a new plan. This plan was wargamed with much better results. Japan's subsequent victory at Pearl Harbor seemed to validate their planning methods.

Yet, was Pearl Harbor a Japanese victory? Certainly it was a tactical victory by standards of attrition ratios. Shortly after his great "victory," Adm Isoroku Yamamoto said, "I fear all we have done is waken a sleeping giant and fill him with a terrible resolve."[63] The sense of purpose Pearl Harbor gave the American people far outweighed any temporary advantage it gave Japan. How could Japan have missed this? Japanese naval wargaming did not take political impact into account.

1942–46: World War and Eclipse

In contrast, the Japanese wargame prior to the Battle of Midway is usually cited as the best example of how *not* to wargame. During the game, the American side's airpower sank two Japanese carriers. Rear Adm Ukagi Matome, commander of their carrier force for the actual operation, unilaterally reversed the judgment of the umpires. With the carriers restored to the game, the Japanese side went on to capture Midway. Just weeks later, the Americans sank the same two carriers, plus two more. This time Admiral Ukagi could not reach into the "dead pile" and replace his ships.[64]

Meanwhile, the US Navy was reaping a rich harvest from its years of wargaming. A few months into the war, Adm Chester Nimitz sent two lieutenant commanders back to the Naval War College to see if the college had ever determined Japanese strengths and weaknesses correctly. The officers found the records of two wargames with Japanese values close to their current intelligence. They returned with the doctrine and plans from those years.

The Marines also got to see how accurate their interwar wargames were. Frankly, their early landings like Tarawa did not unfold as the prewar wargames indicated. These inaccuracies had contributed to flawed doctrine and the development and purchase of not quite the right equipment.[65] But the wargames were close, and the Marines learned that in war it is easier to fix some-

thing that is close than to come up with a capability from scratch.

The Marines Corps refined its wargame techniques quickly. After a few assaults, it was getting results that were so close to actual casualty count and to the time required to secure islands that one marine called it "eerie." Yet, the wargame for the next landing was way off on both counts. They had adjudicated as before and had used the same methods to estimate Japanese strength. Why, then, was the game so wrong? It was due to a Japanese wargame.

The story of this Japanese wargame[66] answers a still bigger question: After the Japanese were hopelessly outnumbered in 1944 and 1945, why did they keep on fighting? When the Japanese ambassador to the United States and his staff returned to Japan, they were taken to a secret location outside Tokyo. There they played the US side in a rare Army/Navy wargame. In that wargame, Japan lost the war, prompting the Japanese to evolve a new strategy. The Japanese could not win the war, but they could kill Americans. They believed that if they could kill enough Americans, the United States would grow war weary and give Japan better terms—hence the doctrine of inflicting the maximum cost on the Americans in time and blood.

This new doctrine was what had gone wrong with the Marine wargame. The Marine Red Team had continued to follow Japan's previous doctrine. Later, Japan would produce a still larger variance from the War Plan Orange wargames using an innovation called *Kamikaze.*

The Soviets evolved a unique style of wargaming.[67] Closer to the elder Reisswitz's game than his son's, Soviet wargames typically centered on terrain models. Using each side's plan for the entire operation, the umpires would use incredibly detailed and cumbersome adjudication procedures to adjudicate all the way to its conclusion. Only then would the two teams be called back and walked through the operation step by step. Essentially, these were one-move wargames.

The Germans made heavy use of wargaming throughout the war.[68] The Germans' wargame of the "Middle" Battle of the Ardennes may have been their most unusual.[69] Early in the fall of 1944, the Fifth Panzer Army conducted a wargame of an American attack on their assigned sector—the Ardennes. While the wargame was going on, the Americans actually attacked. Instead of dismissing the game, Field Marshal Walter Model sent only the commanders of units in contact back to their commands. He then directed that actual American movements be fed into the game. The Germans then wargamed each of their orders before executing them. Finally, when it was time to commit the reserves, Model called their commander over to the wargame map, personally briefed him, and sent him on his way.

The defeat of the Axis powers ushered in an eclipse of wargaming. Obviously, the Axis ceased wargaming. Within the United States, the use of wargaming dropped almost as steeply. Only inside the Soviet Union did wargaming expand and become more rigorous. Few knew this at the time, and few would have cared. If the atomic bomb had made war obsolete, was not wargaming obsolete also?

The Late 1940s and 1950s: The Long Road Back

Our expectations of the future shape that future. The United States expected peace to be guaranteed by atomic weapons, while the Soviets expected continued conflict and doubted the effectiveness of atomic weapons. Because of those expectations, wargaming atrophied within the United States and grew in the Union of Soviet Socialist Republics (USSR). As with the space programs, the Soviets widened their lead in wargaming because the United States was standing still. Unlike space programs, Red wargaming was virtually unknown outside of the Soviet Union, so the lead in that field did *not* spur us to action.

Still, this bipolar wargaming world quickly began to change. The seeds of the eventual

recovery of wargaming in the West were planted even before its post–World War II eclipse. Techniques and technologies developed during the war years would eventually support its recovery.

A lasting legacy of the war was the mobilization of the scientific community for the war effort. The Manhattan Project is the most famous example, but the radar work at the Massachusetts Institute of Technology and countless other projects on both sides of the Atlantic contributed to Allied success throughout the war.

Those who came to be called the operations research (OR) community frequently had a rapid impact. They were first employed to help win the Battle of the Atlantic by seeking ways to use scarce Allied resources to the best effect. Due to some striking successes[70] by war's end, OR was being tasked to look into every type of military problem.

The war also spurred the development of computational devices for applications as diverse as code-breaking and artillery tables. The continuing requirement for computational machines during the beginning of the cold war provided the seed money for what would soon take off as the computer industry.

As for the actual recovery of wargaming, the Navy again led the way. In 1947, the Naval War College increased its use of wargaming through the addition of a wargame-intensive logistics course[71] and then in 1958 when the Naval War College's computerized Navy Electronic Warfare Simulator (NEWS) became operational.[72] While later articles would admit this first computerized wargame never quite worked (aside from its big status screen), the mere fact that the wargame was computerized lent an air of modernity to what was supposed to be an antiquated procedure.

The US Air Force's initial use of wargaming came from the OR community.[73] After the war, the Air Force facilitated the creation of RAND Corporation as a way to retain access to OR specialists. In 1948, RAND began experimenting with "crisis" gaming. By 1954, it launched a number of innovative war-gaming projects. RAND began a computer model of the cold war competition between the United States and the USSR. Input from the Air War College and the State Department prompted RAND to add political and economic factors. Though the depiction of these factors in a December 1954 wargame was viewed as crude, the potential value of including such factors was recognized. To increase flexibility, RAND later turned to a *Free Kriegsspiel* style of play and in so doing reinvented the German political/military wargame. Also in 1954, RAND attempted to game through an entire nuclear war. The next year, RAND used an air warfare model to accomplish a "net assessment" at the Air War College. Given the image of OR at the time, this gave an impression of modernity to Air Force wargaming.

Wargaming also recovered to some extent in the Army. Stung by its lack of preparedness in Korea, the Army began a continuing series of field maneuvers. Their cartoon adversaries, the "Aggressors," did *not* duplicate Soviet tactics, but it was a start. The Army did realize it might have to fight the Soviets, and it began to prepare for that possibility by starting the debriefing of German officers of the last army to do so. One of the things the Army learned from these German generals was the value that the Germans derived from wargaming.

In 1953, a young man named Charles Roberts started selling to civilians a map wargame he had designed called "Tactics." By 1958, he had sold two thousand copies and had come within $30 of breaking even.[74] Encouraged, he founded the Avalon Hill Game Company to sell war, economic, and sports simulation games to the general public.[75]

By the end of the decade, wargaming was clearly on the rebound. In 1958, the US Marine Corps established a "Landing Force Wargame" series at Quantico, Virginia. Even the *Harvard Business Review* published an article on adapting wargaming techniques to develop business strategy.[76] Talk about a comeback.

1960s: As Bad as It Gets

The 1960s got off to a promising start. While wargaming was also becoming more

international,[77] the main source for hope was the new secretary of defense, Robert McNamara. His strategy was to merge successful management techniques from General Motors with proven OR techniques.[78] His goal was effective defense at a cost the United States could sustain over the long haul. At its core, his concept for approving/continuing defense initiatives was elegantly simple: Accomplish a life cycle cost analysis to learn what a proposal would really cost and then use OR techniques to estimate military utility. The concept was sound, but problems would emerge during execution.

The 1960s also started well for naval wargaming, with Admiral Nimitz giving wargaming a ringing endorsement.[79] He said, "The war with Japan had been [enacted] in the game room here by so many people in so many different ways that nothing that happened during the war was a surprise—absolutely nothing except the Kamikaze. . . ." The Naval War College soon began offering a course in wargaming. Later the Navy conducted the first remote wargame, with the players aboard ship and the adjudication accomplished at the Naval War College.[80] By the middle of the decade, the Navy had upgraded its wargaming system to the Warfare Analysis and Research System (WARS).[81] Even so, it believed naval warfare was increasing in scope and complexity faster than the capabilities of its wargames could be increased.

Major advances were also made in Air Force wargaming. Working with the Joint Staff and RAND, the Air Force started to wargame the Strategic Air Command's single integrated operational plan (SIOP) against a Red SIOP.[82] The latter was prepared by intelligence officers who studied not only Soviet weapons but Soviet strategies and tactics as well. The Air Force also wargamed the defense of North America using a wargame called Big Stick. Big Stick was demonstrated at the Air Command and Staff College in 1961 and in 1964 became part of the school's core curriculum. Finally, in 1967, the Air Force introduced the world's first instrumented air weapons range. Established at Eglin AFB,

Florida, and used in weapon-effectiveness testing, the full impact of this innovation would become apparent in the next decade.

Army wargaming also became more effective during the 1960s. Wargaming was used by helicopter enthusiasts to develop the concept of an air-mobile division. It then used wargaming in 1962 to sell the concept to McNamara, who directed that the Army quickly follow through with the idea. When the Army deployed its first air-mobile division to Vietnam, it, like the Marines' before it, found that real combat was different from the wargames.[83] Also like the Marines', the Army's helped ensure that initial concepts were close enough for field adaptation.

Joint wargaming was becoming a reality. In 1961, a wargaming operation was established at the Joint Chiefs of Staff (JCS) level to provide an unbiased, joint arena to conduct McNamara's wargames.[84] The next year, predictions of a wargame cost study helped convince McNamara to support the creation of an air-mobile division, while relatively low-cost-effectiveness predictions influenced him to cancel the Skybolt air-to-surface missile system. This caused a storm of protests from Britain, which had spent significant funds on the program. The United States was blindsided by this criticism because McNamara's attrition-per-dollar calculations did not even consider the possible diplomatic repercussions of program cancellation.

Attempts were made during the 1960s to broaden wargaming beyond attrition. After the Bay of Pigs fiasco, President John F. Kennedy had complained that his military advisers did not understand the political implications of their recommendations. This encouraged the use of politico-military wargaming at the Pentagon and at professional military education (PME) schools. In 1964, the Advanced Research Projects Agency (ARPA) funded efforts to produce a wargame that would depict all the political, psychological, and economic ramifications of an insurgency.[85] This would have produced an entirely new generation of wargames capable of examining all wars in a much more compre-

hensive way. Regrettably, despite some interesting work in this area, the defense planning community continued to use attrition-based wargames.

In 1964, the JCS conducted a politico-military game called "Sigma I-64." This exercise depicted US strategy options for Vietnam. The exercise was repeated with an even higher level of participation. In his book *War Games*, Thomas Allen implies that these wargames predicted a US defeat.[86] However, review of the actual declassified reports on both exercises presents a different image.[87] First, the strategy executed in the wargame did not match what followed in the actual event. During Sigma II-64, the Blue side immediately executed attacks on an expanded version of the JCS's 94 Target Lists, and North Vietnam's ports were promptly mined. Second, each exercise depicted only the first several months of US involvement. Even if they had been able to adjudicate the political consequences of US casualties, the wargames did not cover sufficient time for those consequences to arise.

The most effective wargaming was done by the Communist North Vietnamese. Using Soviet wargaming methods, the North Vietnamese wargamed each of their operations. Familiarity with the plan produced by the Soviet method allowed the Communists to conduct fairly complicated attacks without radios, accomplishing coordination using wristwatches and subordinates' memory of the plan.

The 1960s witnessed the steady growth of civilian wargaming.[88] While the decade started with one publisher and a few thousand annual sales, it ended with a half-dozen publishers with total sales of over 100,000 units per year. The sophistication of these wargames also increased due to the competition of the marketplace.

1970s: To Study War

Very little was published on wargaming in the early 1970s. Perhaps this reflected the antimilitary attitude of the times. It appears that there was also something of a downturn in the actual use of wargaming. If so, the decline was short-lived. As before, the Navy led the way, but this time they were soon overtaken—by the Air Force.

The war in Vietnam was not going well. Among all the other problems, our air-to-air kill ratio had dropped from spectacular in Korea to dismal (occasionally worse than one to one, seldom even two to one). A study called "Red Baron" concluded we were teaching our pilots how to fly, not how to fight. If a pilot survived his first eight missions, his "on-the-job training" would teach him to fight, and he would survive his tour.

The Navy acted first by establishing its Top Gun school in 1971.[89] The aggressor/instructor pilots flew small, nimble jets similar to those flown by the enemy. They also attempted to duplicate Soviet-style tactics. It worked. The Navy saw a significant improvement in its pilots' kill ratios over Vietnam.

The Air Force response took longer to kick off but was more comprehensive. In 1974, the Air Force established the Fighter Weapons School. The school would be similar to the Navy's Top Gun school but different in that air-to-ground tactics would also be taught. Then, in 1975, the Air Force initiated the Red Flag series of exercises to improve the fighting skills of all its combat pilots. Both the school and Red Flag used an electronic range like that at Eglin to allow more accurate adjudication and debriefing of engagements. Over time, the Air Force created an entire enemy "nation" in the Nevada desert complete with strategic targets guarded by simulated air defenses.[90] This also provided a realistic environment for trying out new equipment and tactics.

Also in 1975, the Navy established its Command Readiness Program, an ongoing series of wargames played by the actual surface combatants. At decade's end, the Navy launched a new batch of games, its GLOBAL Wargame series.[91] A deliberate attempt to recapture the ability to gain valuable insights that Navy interwar games produced, GLOBAL also started with fast climactic naval battles. Like in earlier wargames, the rigors of

wargaming changed expectations of a war with the Soviets.[92]

The 1970s were good to commercial wargaming.[93] An increasing number of publishers and growing sales encouraged innovations such as depicting the effects of morale, training levels, surprise, and many other supposedly "intangible" factors. Commercial wargaming was also starting to attract serious attention. In 1974, the US Army became the first service to buy a commercial-style wargame, the tactical ground combat simulation "Fire Fight." In 1975, "Origins," the first civilian wargaming convention, was held. Sales rose steadily during the decade, exceeding two million units in 1979.

Still, the trend with the most profound effect came from within the services. As the 1970s progressed, company-grade officers of the Vietnam era began to enter positions of greater authority. Many felt their fighting forces had been hamstrung by a failure of strategic vision and a lack of basic campaign planning. As individuals and as groups, many of them worked to ensure that the services would be better prepared intellectually the next time. In the Air Force, Lt Col Denny Drew pushed to put more "war" in the war colleges. In the Army, Lt Col Ray Macedonia pressed for more wargaming.

1980s: Promise and Performance

Things seemed to come together for wargaming in the 1980s. Each service, the North Atlantic Treaty Organization (NATO), and commercial wargaming made major progress.

The Army made the most important advances of the early 1980s. In 1980, the Army opened the National Training Center (NTC).[94] This "Red Flag for ground forces" employed an instrumented range, technology similar to laser tag, and a credible aggressor force to produce the most realistic ground-combat environment ever. More wargaming was also being done at home station, thanks to an innovation by III Corps.[95] It simply established a wargaming center at each maneu-

ver base. Wargaming skyrocketed when overworked commanders found the centers meant it took *less* of their time to set up a wargame than other types of training.

In 1981, the Navy upgraded its WARS wargaming system to produce the Naval War Game System (NWGS).[96] Seven years later, they upgraded its system again as the Enhanced Naval War Game System (ENWGS). Each upgrade roughly doubled computing power. Yet, the scope of naval wargaming always seemed beyond its latest system. As in the 1950s, faculty filled the gaps with innovation, common sense, and long hours. The strain stemmed from increasing Naval War College and fleet use, and the GLOBAL exercises. As GLOBAL increased in sophistication, it became increasingly evident that a war with the Soviets would likely be protracted and that in a protracted war the Soviets were doomed.[97] As GLOBAL attracted more of Washington's power hitters, that perception became widespread, coloring not only Navy strategy but national strategy as well. As GLOBAL increased the credibility of wargaming with Congress, the Navy turned to wargaming to support its budgets.[98] In 1988, the Marines began wargaming Program Objectives Memorandum (POM) initiatives as well.[99]

In 1984, the Air Staff director of operations was given oversight of all Air Force wargaming.[100] In 1986, construction was completed on the Air Force's first wargaming facility, located at Maxwell AFB, Alabama. Two years later, this $21-million facility/computer system was declared fully operational[101]—despite continuing problems with adjudication software. As with the early generations of naval computer adjudication, hard-working individuals came up with workarounds.

The 1980s were also successful but transitional years for commercial wargames.[102] Publishers of printed wargames saw their sales plummet. Peaking at 2.2 million units in 1980, sales dropped to less than a million at mid-decade and half a million by the decade's end. Much of the decline was due to the rise of a new (for civilians) wargame medium.

Personal computers allowed the recreational software industry to take off, and with it, computer-based wargames for home use.

The 1980s also saw innovations in joint wargaming. In 1982, the National Defense University finally initiated a wargaming center,[103] and the Warrior Preparation Center became operational in Germany.[104] The latter was specifically designed to allow senior US leaders and NATO headquarters to try war plans without having to maneuver troops. Bills for exercising damage, environmental concerns, and concerns over Soviet capabilities to monitor live exercises all contributed to increasing support for the center. By the late 1980s, all area commanders in chief (CINC) were using wargames. A 1989 study concluded that US Central Command (US-CENTCOM) was clearly ahead of the pack—a circumstance that turned out to be fortunate.

The 1980s also saw the first unclassified reports on how the Soviets wargame. This was due in part to greater openness. Articles that wanted to appear frank but revealed little began to appear in the Soviet open press. However, the real meat came from defectors from the Afghan army. Trained in Soviet wargaming methods, these officers were only too happy to provide details.[105]

Another source was watching the Iraqis during the Iran-Iraq war. The Iraqis used Soviet wargaming methods during their successful offensives during the Iran-Iraq war.[106] However, Soviet wargaming could not adjudicate the strategic impacts of airpower. So, in 1986, Iraq contracted with the US defense contractors for a computer wargame.[107]

1990–91: War on Sand Table and Sand

To a degree, the Gulf War was a fight between Soviet and US wargaming methods. The Iraqi invasion of Kuwait followed the pattern of Soviet wargamed operations—a fast start that petered out at the Saudi border.

Just prior to the Iraqi invasion of Kuwait, CENTCOM played another wargame called "Internal Look." In this exercise, only a token

US force was sent "to show resolve." Iraqi forces drove south, and the United States had trouble getting sufficient forces in-theater to slow the Iraqi advance.[108]

On the morning of the Iraqi attack, Mark Herman, the designer of the commercial wargame "Gulf Strike" and employee of the defense contractor Booz Allen, was approached by the Joint Staff and asked to produce a wargame of the developing situation. He was on contract by lunch. By modifying his commercial wargame "Gulf Strike," he was able to begin play of a now classified wargame by midafternoon![109]

During August, a joint planning cell led by Col John Warden and built in the Air Staff's Checkmate office, produced the Instant Thunder theater air campaign plan. The plan was sent to the Air Force Wargaming Center. The resulting wargame produced no effect, as the software—being designed to model cold war attrition campaigns—did not adjudicate the impact of hitting strategic targets.[110]

As time for the coalition counterattack approached, an element of the US government pushed for CENTCOM to occupy western Iraq with the 101st Air Assault Division. It was believed that this would prevent mobile Scuds from getting close enough to launch against Israel. CENTCOM quietly wargamed such an operation and passed on the estimated casualty figures. The suggestion did not come up again.[111]

Many others were wargaming the Gulf War. Although outcomes varied somewhat,[112] most official wargames indicated that coalition casualties would total about 30,000, of which six thousand would be American fatalities. Senator Sam Nunn (D–Ga.) decided to oppose the counteroffensive. It was his political judgment that the American people would not accept such high casualties.

As the time to attack grew closer, individual units started to wargame their own parts of the plan.[113] At least one Army unit used a commercial wargame. A soldier wrote the publisher stating that a sandstorm had blown their game away and asking that a replacement wargame be sent quickly.[114]

The superb training received during live wargames like those conducted at Red Flag and the NTC contributed much to our success. Pilots based in Turkey referred to northern Iraq as "The Range," and a number of soldiers were taped saying, "The NTC [training] was much harder."

However, computer wargames misled commanders. After high casualties were adjudicated in these games, C-130 transport aircraft were configured for medical airlift, not to fly in the fuel that was actually needed. The wargames indicated that the Iraqis would fight to the last man, hence there was little preparation for prisoners of war (POW).[115]

As coalition forces moved forward, they uncovered evidence of Iraqi wargaming. From the terrain modeled, it was clear the Iraqis were rehearsing to repel an amphibious invasion.[116]

Though we achieved one of the most overwhelming military victories in history, we did not achieve a proportionately positive state of peace. Why not? It appears the United States never wargamed through to peace. The Marines had planned to conduct such a wargame, but military victory came too quickly. Even if it had been conducted, it is doubtful that our attrition models would have anticipated the revolts against Saddam Hussein.

The impact of wargaming on the Gulf War was enormous and mostly positive. Yet casualty predictions were over 20 times too high. These predictions had real political and military consequences. Did this produce yet another eclipse of wargaming? No.

1990s: The Return of Achilles

More money was spent on wargaming in the 1990s than all previous decades.[117] Much of this increased investment is producing excellent value for the cost. Yet, the central problems that caused the bad predictions were pronounced impossible to fix or ignored.

A RAND paper, "The Base of Sand," captured the problem well. What was needed was a more comprehensive adjudication of armed conflicts. More computing power without a more comprehensive understanding of war would simply produce the wrong answer faster and with more persuasive graphics.[118]

In 1990, the deputy secretary of defense created the Executive Council on Modeling and Simulation (EXCIMS) to take a comprehensive look at wargaming.[119] They saw a maze of adjudication software, most looking at one regime, using different data, and producing different answers to the same questions. Ground and naval surface forces had clearly played an important role during the final days of the Desert Storm campaign, yet no wargame could fully depict such a joint operation.

As a first step to bring order to this chaos, a permanent DOD-level office was established. In 1991, the Defense Modeling and Simulation Office (DMSO) was established.[120] Next they established an information clearinghouse so that work was not duplicated out of ignorance. Established in 1993, in 1999 it became the Modeling and Simulation Information Analysis Center (MSIAC).[121] As an interim measure, software was developed to allow existing service wargames to talk to each other. Finally, they funded programs to replace many one-service adjudication engines with a few joint ones. The Joint Warfare System (JWARS) was to replace most analytical models, while the Joint Simulation System (JSIMS), using modules developed by each service, was to replace all the models used to train CINC staffs.[122]

Increased competition for limited defense dollars and the success of GLOBAL as an analytical and lobbying tool have led all the services to conduct GLOBAL-like wargames. Collectively called Title Ten wargames, the Air Force's "Global Engagement" and the Army's "Army after Next" are now held annually.[123]

The 1990s were full of surprises for commercial wargaming.[124] Sales of printed wargames continued to decline, falling to two hundred thousand units a year. The industry then stabilized desktop publishing, allowing lower sales per title to still be profitable. In contrast, the recreational software industry has exploded ($25 billion in worldwide sales

in 1997).[125] However, wargaming's share of those sales has fallen from 25 percent when personal computers (PC) began to about 10 percent today.[126] (Still, 10 percent of $25 billion. . . .) Most surprisingly, wargaming with miniatures made a comeback, its proponents saying their painted figures are the ultimate "high-resolution graphics."[127] Commercial wargaming has also become global, with many US titles selling well overseas and several foreign titles selling well in the United States.

As the 1990s ended, there were some indications that defense wargaming may have reached the millennium early. In October 1999, a well-attended NATO conference on modeling, simulation, and wargaming demonstrated that wargaming had indeed become international again. Earlier in the year a major test of JSIMS by the US Atlantic Command demonstrated that this important $150-million system was approaching operational usefulness.[128] Finally, as a fitting conclusion to a century of achievement, on 28 September 1999, the Naval War College dedicated its new $19-million wargaming facility. Most appropriately, this latest attempt by the Navy to "push the envelope" is named for the selfless individual who started it all—McCarty Little Hall.[129]

Yet, despite a decade of heavy investment and significant innovation, all is not well with defense wargaming. In the spring of 1999, defense wargaming received the acid test when America again sent its people into harm's way, this time in the skies over Kosovo. How well did wargaming do? Again, wargames failed to provide insights to the types of human effects and system impacts that were the main focus of NATO's air campaign.

How can these deficiencies be resolved? The history of wargaming provides proof of the importance and persistence of the problem and some clues to the solution. Describing a possible solution will require an article of its own. □

Notes

1. As for formal definitions, Webster defines *wargame* as a "simulated battle in military training maneuvers." While the *Official Dictionary of Military Terms* defines *wargame* as "a simulation by whatever means of a military operation involving two or more opposing forces, using rules, data, and procedures designed to depict an actual or assumed real-life situation."

2. There are several works on very early strategy games. Perhaps the best brief account is Alfred H. Hausrath, *Venture Simulation in War, Business, and Politics* (New York: McGraw-Hill Book Company, 1971), 3–5.

3. For a general study in the rise of quantification in the West, see Alfred W. Crosby's *The Measure of Reality: Quantification and Western Society, 1240–1600* (Cambridge, U.K.: Cambridge University Press, 1997).

4. John P. Young, *History and Bibliography of War Gaming* (Washington, D.C.: Department of the Army, 1957), 2–6.

5. Peter P. Perla. *The Art of Wargaming: A Guide for Professionals and Hobbyists* (Annapolis, Md.: Naval Institute Press, 1990), 19–21.

6. Indeed, Napoleon *may* have invented the first operational war simulation. He would "walk through" his campaigns in advance, using colored pins on maps to help him visualize where his units and those of his enemies would be and when.

7. Hausrath, 5–8.

8. Stephen B. Patrick. *Wargame Design* (New York: Simulations Publications, Inc., 1977), 4.

9. Young, 9.

10. Besides, the younger officers might come up with something innovative.

11. He was always the senior umpire.

12. The following list of countries and when they began wargaming was derived from several sources, principally Young, 11–13:

> 1866 - Austro-Hungarian
> 1872/1883 - England
> 1873 - Italy
> 1874/1889 - France
> 1820/1875/1905 - Russia
> Secondary diffusion - Japan, Turkey, Latin America

13. However, some believe that Lt C. A. L. Totten was first. While advocates of both make good cases, Livermore is generally considered first because he was the first to publish. See Young, 16, for more detail.

14. The noted author David Isby E-mailed me an equally clear though not so succinct Sherman quote: "I know there exist many good men, who honestly believe that one may, by the aid of modern science, sit in comfort and ease in his office chair, and with little blocks of wood to represent men or even with algebraic symbols, master the great game of war. I think this is an insidious and most dangerous mistake. . . . You must understand men, without which your past knowledge were vain."

15. Anthony S. Nicolosi, "The Spirit of McCarty Little," US Naval Institute *Proceedings* 110 (September 1984): 77.

16. Capt John Phillips Colomb, RN, appears to have designed the world's first true naval wargame. See Francis J. McHugh, "Eighty Years of War Gaming," *Navy War College Review* 21 (March 1969): 88–90.

17. Following is one indication of that influence: In 1897, Theodore Roosevelt wrote the Naval War College to ensure his

visit would coincide with one of their big strategic games. Perla, 66.

18. William McCarty Little, "The Strategic Naval War Game or Chart Maneuver," US Naval Institute *Proceedings* 38 (December 1912): 1223.

19. Young, 18.

20. Little, 1213–33.

21. The similarity of some of the concepts in this article and those espoused by Col John Boyd, USAF, over six decades later are striking. My suspicion is they both came to the same truth by different routes. For a tight description of Boyd's concepts, see David S. Fadok, *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis* (Maxwell AFB, Ala.: Air University Press, 1995), 13–20.

22. In the late 1980s, this author was told by a senior Air Force wargaming official that it was impossible to depict break points in contemporary Air Force wargames. For more information on how Germany was doing the "impossible" 110 years earlier, see the 1968 book by Andrew Wilson, *The Bomb and the Computer* (New York: Delacorte Press, 1968), 12.

23. Perla, 31–34

24. Lt Roger Harrison (promoted to lieutenant colonel in 1983), *The Influence of War Gaming on the Schlieffen Plan* (Washington, D.C.: Georgetown University Graduate School, 1967).

25. During the early and mid-1800s, a number of war chess games were published in the United States, but these had more in common with earlier versions of war chess than with modern wargaming. See George Gush with Andrew Finch, *A Guide to Wargaming* (New York: Hippocrene Books, 1980), 24.

26. The Oxford Kriegsspiel Club was founded in 1873. See ibid., 24.

27. Mentioned in E-mail from James F. Dunnigan, "dean" of contemporary commercial wargames designers.

28. He is considered by many to be the father of modern military history.

29. For more information on Hans Delbrück, see Gordon A. Craig's chapter on him in Peter Paret's *Makers of Modern Strategy* (Princeton, N.J.: Princeton University Press, 1986).

30. Harrison.

31. For more detail, see Wilson, 28–32.

32. M. R. J. Hope Thompson, "The Military War Game," *Journal of the Royal United Service Institution* 11 (February 1962): 50.

33. The French thought they knew Germany's broad plan in the event of war—an immediate offensive against them hoping to defeat France before Russia could fully mobilize. To defeat this strategy, France urged its Russian ally to focus all its mobilization efforts on its two most modern armies. As their mobilization was complete, these two armies would invade East Prussia. This would help Russia since the Germans would be unready for such an early offensive. Even more importantly, it might have helped to keep France in the war by causing the Germans to divert forces from their campaign against France. Russia agreed to the French strategy and developed it into a detailed plan. The wargame would test this new plan.

34. For more detail, see Wilson, 33.

35. Harrison.

36. Barbara W. Tuchman, *The Guns of August* (New York: Macmillan Publishing Company, 1962), 90–91.

37. Paret, 349–50

38. After World War II, General Manstein claimed these exercises were initiated at his suggestion. See Francis J. McHugh, *Fundamentals of War Gaming* (Newport, R.I.: Naval War College, 1966).

39. B. H. Liddell Hart, *The Liddell Hart Memoirs* (New York: G. P. Putnam's Sons, 1965), 252–54.

40. All I have found on Army wargaming during the interwar period are two brief references in articles on naval wargaming.

41. Maj H. Dwight Griffin et al., *Air Corps Tactical School: The Untold Story* (Maxwell AFB, Ala.: Air Command and Staff College, 1995), 7.

42. Claire Lee Chennault, *Way of a Fighter: The Memoirs of Claire Lee Chennault* (New York: G. P. Putnam's Sons, 1949), 18–19.

43. Robert T. Finney, *History of the Air Corps Tactical School, 1920–1940* (Washington, D.C.: Center for Air Force History, 1992), 22–23.

44. Various lectures at Air University have gone into greater depth than any published source I have found, but the bare bones of this method is laid out in Griffin et al., 5.

45. During work on my master's thesis on the history of wargaming, I did not find any information on wargaming at the Air Corps Tactical School. The above is based on conversations I had in the early 1990s with Maj (now Col) Peter Faber while we were both at the School of Advanced Airpower Studies. His PhD dissertation is on the Air Corps Tactical School.

46. Michael Vlahos, "Wargaming, the Enforcer of Strategic Realism: 1919–1942," *Navy War College Review* 39 (March 1986): 7–22.

47. While in this case the ship was an early aircraft carrier, wargames could also have a more systematic effect on design. For example, the design of the *Brooklyn*-class light cruisers was validated through wargaming. See John Prados, *Pentagon Games: War Games and the American Military* (New York: Perennial Library, c.1987), 4.

48. While the Marines wargamed at least as early as 1924 (Victor H. Krulak, *First to Fight: An Inside View of the U.S. Marine Corps* [Annapolis, Md.: Naval Institute Press, 1984], 89), work on developing an amphibious doctrine shifted into high gear in 1933 when the commandant of Marine Corps schools discontinued all classes so faculty and students could work on defining what was needed for the capability. John H. Cushman, "Maneuver from the Sea," US Naval Institute *Proceedings* 119 (April 1993): 47.

49. Cushman, 47.

50. Many sources allude to this incident. The earliest I've found is in Wilson, 21.

51. T. N. Dupuy, *A Genius for War* (McLean, Va.: The Dupuy Institute, 1984), 266.

52. For the Operation Sea Lion wargame, see Wilson, 38; and Hausrath, 27. For the Luftwaffe's wargame, see James S. Corum's *The Luftwaffe: Creating the Operational Air War, 1918–1940* (Lawrence, Kans.: University of Kansas Press, 1997), 356; also see Edward L. Homze, *Arming the Luftwaffe: The Reich Air Ministry and the German Aircraft Industry, 1919–39* (Lincoln, Nebr.: University of Nebraska Press, 1972), 243.

53. Again, there are several accounts. While somewhat verbose, the most authoritative account comes from the US Army program to learn from the German army's experiences during World War II by producing a number of papers by the German generals themselves. See Rudolf M. Hofmann, *German Army War Games* (Carlisle Barracks, Pa.: US Army War College, 1983), 38–44.

54. Earl F. Ziemke and Magna E. Bauer, *Moscow to Stalingrad: Decision in the East* (Washington, D.C.: Center of Military History, US Army, 1987), 16–18.

55. Christopher R. Gabel, *The U.S. Army GHQ Maneuvers of 1941* (Washington, D.C.: Center of Military History, US Army, 1991).

56. Martin Blumenson's chapter on Kasserine in *America's First Battles, 1776–1965*, eds. Charles E. Heller and William A. Stofft (Lawrence, Kans.: University of Kansas Press, 1986), 226–65, provides a good, concise if somewhat Army-centric view of the battle. The lessons the battle taught about tank destroyers are summarized on page 263.

57. Comments on the depiction of airpower during the Louisiana maneuvers is based on research done by then-Maj

Mark Clodfelter while he was on the faculty of the School of Advanced Airpower Studies.

58. Warren A. Trest, *Air Force Roles and Missions: A History* (Washington, D.C.: Air Force History and Museums Program, 1998), 77.

59. In fairness, the air battle over Kasserine also demonstrated the need for sufficient air base construction engineers to allow forward fields to keep up with advancing ground forces.

60. Perla, 45.

61. Prados, 1–2.

62. While this quote is often attributed to Admiral Yamamoto, nowhere is it presented more powerfully than when it is shown on screen at the conclusion of the feature movie *Tora, Tora, Tora*.

63. This morality play is arguably the most often-told incident from the history of wargaming. While the above is true, it makes the argument against the admiral more "open and shut" than was actually the case. Most authors fail to mention that the American aircraft that sank the carriers during the wargame were B-17s. In the actual battle, B-17s proved completely ineffective (during the battle, B-17s did not hit a single enemy ship), so, in a narrow sense, Ukagi was right. Still, Admiral Ukagi failed to address the issue that the loss of his carriers in the wargame should have brought up: What if the Americans get in the first hit? Would we [the Japanese] have enough strength to win anyway?

64. For the best brief account of Tarawa and its lessons, see Ronald H. Spector, *The Eagle against the Sun: The American War with Japan* (New York: Vintage Books, 1985), 259–66.

65. Dr. Ronald H. Spector went into detail on this incident during a master's degree course he gave for the University of Alabama at the Air University. Several published sources touch on it, such as Hausrath, 32.

66. The most detailed description of Soviet wargaming I have found was based on the debriefing of two Afghan army colonels. See John Sloan et al., *Soviet Style Wargames* (Washington, D.C.: Science Applications, Inc., June 1986).

67. Early in 1944, the Germans conducted a wargame on an Allied invasion of France that focused on German logistical preparations. The exercise prompted and clarified logistical improvements that increased the effectiveness of German resistance when the invasion came. See *World War II German Military Studies: A Collection of 213 Special Reports on the Second World War Prepared by Former Officers of the Wehrmacht for the United States Army*, vol. 12 (Washington, D.C.: Historical Division, US Army Europe, 1979), 50. Later, German reconnaissance spotted some of the preparations across the Channel from Normandy. The Germans concluded that the Allies were preparing a feint, a secondary invasion intended to trick them into thinking Normandy was the main attack. Still, they conducted a wargame of an Allied landing at Normandy and concluded that an Allied lodgment was probable! If the feint proved successful, the Americans might decide to make the feint their main effort. For this and other reasons, the Germans therefore ordered reinforcements into Normandy. The regiment that made Omaha Beach so bloody was one of those reinforcements. Ironically, while one German wargame made D day far more costly, another actually helped the Allied cause. When the invasion took place, many key commanders were away from their headquarters, on their way to a second wargame. This wargame would test how well they could meet an invasion of Normandy when all the planned reinforcements were in place. While many sources about D day mention German anticipation of a feint invasion in Normandy and the final wargame (the most well known being Cornelius Ryan's *The Longest Day, June 6, 1944* [New York: Simon and Schuster, 1959], 80–81, and the movie of the same name), I have been unable to find a source for the Germans' first Normandy wargame and would appreciate any leads.

68. Hausrath, 27.

69. Wilson, 45–62.

70. Perla, 77.

71. Ibid, 78.

72. The best work on specific early RAND/Air Force wargaming initiatives is Ghamari-Tabrizi's soon to be published "Simulating the Unthinkable: Gaming Nuclear War in the 1950s and 1960s." For a more general history of the RAND–Air Force relationship, see RAND's commemorative booklet "50th Anniversary, Project Air Force, 1946–1996."

73. The staff of *Strategy and Tactics* magazine, *Wargame Design* (New York: Simulations Publications, 1977), 11.

74. Martin Campion and Steven Patrick, "The History of Wargaming," *Strategy and Tactics* (1972), 12.

75. G. R. Andlinger, "Looking Around: What Can Business Games Do?" *Harvard Business Review* 36, no. 4 (July–August 1958): 147–52.

76. See Hausrath, 143–44, for a quick overview of UK and Canadian wargaming at that time. There were also some open-source hints at Soviet wargaming. See Ivan Boikov, "At The General Staff Academy," *Soviet Military Review*, June 1967, 12–13.

77. Ghamari-Tabrizi's paper builds a convincing picture of the level of credibility OR enjoyed at the time.

78. E. B. Potter, *Nimitz* (Annapolis, Md.: Naval Institute Press, 1976), 136.

79. Perla, 83.

80. Ibid., 85.

81. Actually, the term used was *Red Integrated Strategic Operation Plan* (RISOP).

82. Hausrath, 47.

83. Thomas B. Allen, *War Games* (New York: McGraw-Hill, 1987), 28.

84. Ibid., 188.

85. Ibid., 193–227.

86. See the discussion of Sigma I-64, II-64, and the Sigma game series in Allen, 193–208.

87. Campion and Patrick, 17.

88. Briefing, "History of Modeling and Simulation," Staff Officers Course, Defense Modeling and Simulation Office, Washington, D.C. The course is held roughly a dozen times a year, typically half the time at Orlando, Florida, a quarter of the time in the D.C. area, and the remander around the United States.

89. Amazingly, no formal history of Red Flag has yet been written, but Michael Skinner's *Red Flag: Air Combat for the '80s* (Novato, Calif.: Presidio Press, 1984) provides a great snapshot of what it was like going through Red Flag in the mid-1980s.

90. Bud Hay and Bob Gile's *Global War Game: The First Five Years* (Newport, R.I.: Naval War College, 1993) does a great job of describing the origins and early growth of the series.

91. Henry Bartlett and Paul Holman, "GLOBAL War Games and the Real World," US Naval Institute *Proceedings* 117 (February 1992): 25.

92. See Stephen B. Patrick, "The History of Wargaming Update," *Strategy & Tactics* (1975), 11; and Seth Owen, "The History of Wargaming 1975–1990," *Strategy & Tactics* (1990), 7.

93. Anne W. Chapman, *The Origins and Development of the National Training Center, 1976–1984* (Fort Monroe, Va.: US Army Training and Doctrine Command, 1992).

94. Col John D. Borgman and Maj Richard L. Hooverson, "The Rebirth of Wargaming," *Armor*, September–October 1981, 44.

95. Perla, 85.

96. Hay and Gile, 52.

97. Col Raymond A. Hord, "The Marine Corps Wargaming and Assessment Center," *Marine Corps Gazette* 73, no. 12 (December 1989): 38–40.

98. Ibid.

99. David B. Lee, "War Gaming: Thinking for the Future," *Airpower Journal* 4, no. 2 (Summer 1990): 44.

100. Nick Lackeos, "Military Presence Reinforces Area Economy," *Montgomery Advertiser*, 12 May 1989, 5H.

101. Owen, 51–56. Comments also based on E-mailed comments from James F. Dunnigan and Gene Billingsley, president of GMT Games (a leading printed wargame publisher and computer wargame developer).

102. Cited in the briefing, "History of Modeling and Simulation," during the Defense Modeling and Simulation Office's Modeling & Simulation Staff Officers Course.

103. Lee, 44.

104. Sloan et al.

105. During a briefing on the later stages of the Iran/Iraq war, a NATO officer who served as an air attaché in Baghdad during that war described the physical setup of an Iraqi wargaming facility. The facility perfectly matched the setup of a Soviet one.

106. Allen, 4.

107. Richard M. Swain, *Lucky War: Third Army in Desert Storm* (Fort Leavenworth, Kans.: US Army Command and General Staff College Press, 1994), 7–8.

108. James F. Dunnigan and Raymond M. Macedonia, *Getting It Right: American Military Reform after Vietnam to the Persian Gulf and Beyond* (New York: William Morrow and Company, 1993), 67.

109. Richard T. Reynolds touches on this incident in his *Heart of the Storm* (Maxwell AFB, Ala.: Air University Press, 1995), 48. The above is primarily based on my conversations with Colonel Reynolds.

110. Based on briefing by Col Gary Ware (General Schwarzkopf's chief of modeling, simulation, and wargaming during the war, and previously director of the Air Force Wargaming Center), given to the College of Aerospace Doctrine, Research and Education (CADRE) shortly after the war.

111. While one source (Claudio Cioffi-Revilla, "On the Likely Magnitude, Extent, and Duration of an Iraq-UN War," *Journal of Conflict Resolution* 35, no. 3 [September 1991]: 387–411) predicted casualties in the "100,000 to low millions" range, and a few analysts like Col Trevor Dupuy, USA Retired, and James Dunnigan would later brag about being "only" an order of magnitude off, most estimates fell in the range given in the test. This is confirmed by Mark Herman, "Crisis in the Gulf: Planning for the Worst," *Jane's Defense Weekly* 15, no. 3 (19 January 1991): 83; and an E-mail from Mark Herman, 11 February 2000.

112. The *Army Times* ran a series of division and independent maneuver regiment after-action reports. About half the articles described some sort of unit wargaming. The most memorable anecdote involved a battalion commander expressing a preference for death over war-gaming it one more time.

113. Mentioned by Frank Chadwick, the publisher who received the letter, during a talk at Origins 91, an international strategy gaming conference.

114. Commercial wargame designers/military analysts such as Jim Dunnigan and Charles Kamps predicted far fewer coalition casualties than the "official" estimates—mainly because they were used for "factoring in" the intangibles that old-time government hands always said couldn't be calculated.

115. A picture of the Iraqi terrain model is in the center section of Norman Friedman's *Desert Victory: The War for Kuwait* (Annapolis, Md.: Naval Institute Press, 1991).

116. It is difficult to show a trend line for spending on wargaming. Estimates for the same year will vary based on what is considered a wargame. Apparently using a working definition of any multisided simulation of armed conflict, John Prados in 1987 estimated a billion dollars was being spent annually through the defense establishment on wargames and wargaming. During an early 1990s conference, I could not get the director of the Joint Staff's J-8 section to even guess at a level of annual spending, but he said my guess of two billion dollars was probably not far off. Recently, an officer at the Air Force Doctrine Center estimated annual spending of over three billion dollars, given the above definition.

117. Paul K. Davis and Donald Blumenthal, *The Base of Sand Problem: A White Paper on the State of Military Combat Modeling* (Santa Monica, Calif.: RAND, 1991).

118. History of Modeling and Simulation, M&S Staff Officers Course.

119. *The Historical Background on the MSIAC*, 18 June 1999.

120. Ibid.

121. Rick Adams, "An M & S Primer," *Defense News Marketing Supplement*, 1996, 9–10.

122. William B. Scott, "'Title-10' Games Shape Policies," *Aviation Week & Space Technology*, 2 November 1998, 61–62.

123. Perhaps most surprising of all, there has been some movement toward cooperation between the military and commercial wargaming communities. See J. R. Wilson, "Shall We Play a Game?" *Military Training Technology*, (1999), 20–25.

124. Comments are also based on E-mailed comments from James F. Dunnigan and Gene Billingsley.

125. Press release from the Software Developers Association during the 1998 Computer Game Developers Conference, Santa Clara, California, 1998.

126. Estimate by Evan Brooks, originator of an on-line index of computer wargames and former wargames editor for *Computer Gaming World*.

127. Based on comments made by Wilbur E. Gray, secretary of the Historical Miniatures Gaming Society–East, to Connections, the Air University-sponsored international, interdisiplinary conference on conflict simulation, 1998.

128. Paul Holtzhausen, "On Target," *Military Training Technology* (1999), 17.

129. Jerry O'Brien, "Navy Dedicates Premier War-Gaming Center," *Providence Journal-Bulletin*, 28 September 1999.

The *Force* in US Air Force

Fodder for Your Professional Reading on the Implements of Strategy and Tactics for Conventional Air War

DR. DAVID R. METS*

Editorial Abstract: As a former editor and frequent contributor to APJ, Dr. Dave Mets is one of our most recognized and popular authors. In another of his now famous "fodder" articles, he again offers readers an overview and recommended readings on a topic of professional interest. For this installment, he has chosen the evolution of Air Force weaponry. This is more than just a litany of technology, as Dr. Mets explores related issues of tactics, doctrine, force structure, and so forth. As weapons get smarter and we contemplate arming unmanned aerial vehicles and moving missions to space platforms, the reader should, as the title suggests, consider the very nature of what it may mean to be an air "force."

YOU MAY HAVE noticed previous "Fodder" articles in the *Aerospace Power Journal*. In them we have sought to give you some tools to help you plan and execute your own professional reading programs. Most of them dealt with subjects unfamiliar to many air warriors/ scholars and addressed new books in that field. One looked at naval aviation and another at the Pacific dimensions of World War II, based on the theory that modern airmen were more familiar with the air war against

Germany. Here, I aim to acquaint you with the most prominent conventional air weapons that are the *Force* in US Air Force and, during that process, review a new book on the development of one of the most famous aerial weapons of all time—the Sidewinder missile. Not until the 24th year of my service as a flyer was I assigned to an aircraft—the AC-130—that had any lethal weapons at all. After giving the matter some thought, I concluded that that experience may have been more typical than otherwise and thus decided to write a "Fodder" article on the weapons of airmen and their acquirement. Typical of this series, this piece concludes with a sampler of 10 books that will enhance the expertise of air warriors/scholars in the tools of their trade.

A Shoestring Primer on the Development of Air Weapons

The Era of Converted Guns and Shells

For many years after the Wright brothers first flew, air forces simply adapted the weapons of ground warfare for use in the air. That is probably not all that remarkable, given the maturity of gun and explosive technologies, common for hundreds of years. Airframe and internal-combustion-engine technologies absorbed about all the energy and money that airmen could muster. Thus, both the flexible and fixed guns of the Great War had been designed for war on the ground, and the first bombs were merely rejected artillery shells with tail fins attached. These practices continued well into World War II and beyond. The standard American gun was the 1917 Browning, and bombs differed little in principle from those of World War I.

The World War II Catalyst

The second great war in a generation provided the impetus for original thinking about weapons on both sides of the Atlantic, although standard weapons used in war often did not reflect those ideas. The Germans experimented with a variety of guided bombs and even air-to-air missiles, and the US Navy and US Army Air Forces had programs on all of the guided-weapons technologies that have since come into use, except the technology for the laser-guided bomb (LGB). On top of that, the United States reaped a great harvest of German ideas about aerial technology with its foresighted Operation Paperclip at the end of the war. The BAT, an autonomous radar-guided glide bomb, actually got some ship kills in the Pacific before the war ended.

The Morning Twilight of the Guided-Weapons Age

During the huge drawdown after the war, nuclear weapons, new electronics, and jets largely absorbed the available energy and money, leaving little for the development of conventional weapons. The Berlin airlift and Korean War demonstrated that all conflicts might not become nuclear, and, even in those years, the Navy and Air Force proceeded with developing air-to-air guided missiles. Some of the World War II guided-bomb technologies were resurrected for the Korean War, and the Navy's and the Air Force's losses to ground fire stirred a modicum of new interest in guided weapons that would yield both accuracy and standoff for crews. This brought air-to-air missiles into standard use by 1956, and the Sidewinder got its first kill in 1958.

Disappointments of the Fight above Vietnam

The Korean War also led to the development of the Bull Pup standoff air-to-surface missile, which proved unsatisfactory in several respects. The Sidewinder infrared and Sparrow radar missiles did not live up to their great expectations for several reasons. However, toward the end of the Vietnam War, electro-optical bombs and especially LGBs proved successful and instrumental in checking the North Vietnamese army in Linebacker I. We had made a beginning toward penetrating the sanctuary of darkness, and the efficiency of precision-guided munitions (PGM) also tended to swing the pendulum away from surface-to-air missiles and antiaircraft artillery back in favor of the aerial offensive.

The Maturation of Precision Guidance at Century's End

As the century waned, the Gulf War and Kosovo demonstrated that the night had indeed become the friend of the aerial offensive and that the enemy had lost the sanctuary of darkness. Laser, infrared, radar, and Global Positioning System (GPS) guidance systems all helped achieve efficiencies that would enable parallel (as opposed to sequential) attack and greatly reduce friendly casualties. Some people began to talk about deterrence via conventional PGMs instead of nuclear weapons. The advances in miniaturization and solid-state circuitry greatly improved the reliability and envelopes of both Sparrow and Sidewinder, and the fielding of the new advanced medium-range air-to-air missile (AMRAAM) permitted the West to dominate the air battle as well.

Implications for the Future

The longed-for collapse of the Soviet Union did not free us of security worries. On the contrary, it made the future less ponderable than it had been since the 1930s. The threat was perhaps less forbidding but also much less well defined, making it difficult to predict what the improvement in PGMs might mean for the future. Many people argued that the West so dominated conventional warfare that all thinking adversaries would seek asymmetric means to overcome that advantage. Guerrilla warfare and terrorism were only two of the possible methods. Too, air forces seem to have become victims of their own successes. PGMs had seemingly led to such rapid and bloodless victories that airmen worried that the expectations had now become unreasonably high—enough to paralyze the use of airpower. But others argued that the new precision allowed us to use conventional warheads to achieve objectives formerly possible only with nuclear weapons. Thus, these weapons might underwrite deterrence more effectively, in that the deterred parties could not count on the president's humanitarian reluctance to use them, as they could in the case of nuclear weapons.

The Era of Converted Guns and Shells

Lt Col Isaac Newton Lewis, US Army, first demonstrated the use of his lightweight machine gun from an American aircraft in 1912. Actually, Lewis had envisioned his weapon for use by soldiers on the move—not as an aircraft weapon—because the Maxim gun had proved too heavy for mobile infantry. The Marine Corps had adopted Lewis's gun before the outbreak of World War I, but when leathernecks arrived in France, our forces needed a lighter aircraft weapon so badly that Gen John J. Pershing required the Marines to

give it up to the Air Service. The Lewis gun went on to serve in flexible installations on practically all Allied aircraft throughout the war and well beyond, getting its last kill as a ground gun against a German V-1 buzz bomb in 1944.[1]

The story was the same for most of the fixed-gun installations on the Allied side—even among their enemies. Long before, Hiram Maxim had designed the machine gun, which, along with the steamboat, enabled the imperialistic drive that conquered Africa in the latter part of the nineteenth century. Both the Allied Vickers and the German Spandau aircraft machine guns—standard weapons on both sides—derived from the Maxim design, as did the ground guns. The latter comprised part of the technological explanation for the defensive stalemate on the ground.[2]

Similarly, bombs dropped from aircraft in World War I were at first adaptations from artillery rounds or projectiles rejected for use in ground guns. Explosive shells, an old idea, had seen a good deal of improvement since the American Civil War. In the early days, aircrews threw the weapons, now sporting fins and necessarily light, overboard.[3] Only later did they attach them to simple bomb racks or sometimes even put them in internal bomb bays. The fully mature technology for the fuzes, filler, and bomb casing did not call for intensive research and development programs for many years thereafter—especially since both the internal combustion engine and aerodynamics remained on the steep parts of their development curves, crying out for heavy investments. The late part of the Great War saw bombs especially developed for aircraft but without much serious design and testing work. One assumed that the streamlined bomb casings that emerged would greatly reduce drag but substantially increase the complexity of manufacture compared to cylindrical bomb casings. Not until after the war did anyone have time to subject them to wind-tunnel testing, which revealed that reduced drag did not compensate for increased complexity.[4] Still, the basic design

called for standard explosives in a casing much simpler and less robust than that of an artillery shell, nose and tail fuzes far less robust than those in artillery, and simple tail fins. This design endured until the end of World War II, the only remaining changes involving a larger size and a stubbier shape to increase the load in bomb bays.

Much theorizing addressed the use of the new airpower technology to bring about a revolution in warfare—especially to eliminate any repetition of the ordeal in the trenches. But this did not pay a great deal of attention to whether armament technology would support the theories of Giulio Douhet, Hugh Trenchard, Billy Mitchell, members of the Air Corps Tactical School, and others—due in part to factors arising from organization.

As early as 1920, the Army decided on a division of developmental labor that conditioned the way things happened for long after. Everything that remained with the aircraft, except its guns, would become the responsibility of airmen at what became Wright-Patterson AFB, Ohio—in the hands of the Air Service (later the Air Corps, Army Air Forces, and, ultimately, the US Air Force). Everything departing the airplane, plus the guns, remained with the Ordnance Department or the Chemical Service of the Army.[5] Armor-piercing bombs, another exception, remained a specialty of the Navy. This arrangement persisted until the 1960s, in large part because the leaders of the air arm had to promise Congress that unification would not lead to the Air Force's establishing a third set of arsenals and weapons factories.[6] Consequently, conventional weapons did not have an advocacy group within the Air Force establishment, and no one could make a below-the-zone promotion by becoming the service's most brilliant expert in bomb development or the like.

The World War II Catalyst

War, especially total war, tends to focus research and development on incremental change—relatively minor improvements to

weapons on hand at the outset—because major changes in weapons suites tend to radically reduce production output and, consequently, the numbers of weapons available. Thus, of all the aircraft with which the United States fought World War II, only the P-61 and the B-29 had not flown before the attack on Pearl Harbor. So, too, the Browning M-2 (and its little-changed derivative, the M-3), the standard long before the fighting began, remained so when the war ended. In fact, it soldiered on until later models of the F-86 converted to 20 mm guns at the end of the Korean War.[7] However, this affected the Allied side less than it did the Axis.

Only the aggressors can make the assumption that a conflict will be a short war. Without that assumption, both the Nazi and Japanese decisions to go to war would have been even more insane than they were. A corollary of those decisions held that any technology that could not mature in time to help in a short war would have to be put off until after the Axis had won. But the Allies had to assume that they would fight as long as it took—a war to the end. Thus, the early days emphasized numbers and only incremental change. But as the war continued, they began to draw even with the Axis and then to greatly outnumber the enemy. At that point, Gen Henry Arnold and his colleagues gave increasing attention to longer-term improvements. Although many German scientists and engineers did have innovative ideas, the weaknesses of their economic system and their grand strategy did not yield the time required to transform those ideas into standardized weapons systems. The Allied side did have the time and resources.

Neither gun nor explosive technology made really dramatic advances among the Allied technological establishments. But numerous research projects sought to solve the problem of hitting a target from altitude. The Germans and the US Navy had found a partial solution to the problem even before the war—dive-bombing. But any aircraft stout enough for that work would likely prove too limited in both bomb loadout and range.

Too, diving on a target entailed flying straight down the barrels of the antiaircraft artillery, which tended to solve all four of the gunner's problems by yielding a constant azimuth and elevation and sooner or later flying into range. When it did so, it automatically solved the timing problem, since it flew right down the trajectory.

The Germans found another partial solution through standoff with precision, contriving a variety of bombs and rockets with a relatively simple guidance system. All of them needed a data link of some sort through which the bomber could transmit range and azimuth corrections. The "Fritz," a glide bomb with a flare in its tail and fins with tabs on them for steering the bomb up and down or right and left, sank the Italian battleship *Roma* in September 1943, as it attempted to surrender to the Allies. The second of the two hits, using a radio data link, set off the ship's magazine and sent it to the bottom. Correctly anticipating that the Allies would soon develop a jammer for the data link, the Luftwaffe had prepared a wire-guided version.[8] The Germans also developed a powered guided bomb with a similar radio-frequency data link but a smaller warhead—a concept not radically different from that of the Air Force's current AGM-130, although it did not contain its own seeker. Despite their innovativeness, these weapons did not go into standard use—probably because Hitler feared that the Allies would capture a dud and use that technology to increase the effect of their air superiority against Germany. Thus, he prohibited the use of the Fritz over land, where it might have done the *Wehrmacht* more good than at sea—albeit the powered bomb did achieve several kills of lighter ships before the war ended.[9] Hitler need not have worried, though, because more advanced guidance technologies were already being developed in America.

These advancements did not include the azimuth only (AZON) bomb, a free-fall weapon that had a guidance system similar to that of the Fritz. The weapon, guided through a radio-frequency data link with the

bomber, received only right and left corrections en route to the target. It had vertical stabilization but no elevators for raising or lowering the nose to affect the range, making it significantly more accurate than unguided bombs against long, narrow targets like bridges and roads. Combat tests in both Italy and the China-Burma-India theater produced encouraging results. However, the "perfect is the enemy of the good enough" phenomenon arose when developers opposed the standardization of AZON because the range and azimuth (RAZON) bomb was just around the corner, promising so much more.[10]

RAZON bore even more similarity to the Fritz than did AZON. However, in the days of vacuum tubes and mechanical gyroscopes, development could not move along fast enough to get this weapon into combat before the war ended. Sporadic attempts to improve it occurred in the late 1940s, and RAZON tested out encouragingly during the Korean War. But the reliability problem persisted. Meanwhile, many other guidance technologies underwent development in America before Hiroshima.[11]

These included systems based on infrared and radar. However, General Arnold had decided to go for the simple solution (AZON and RAZON), fearing that the more complex technologies would not be ready in time for the war at hand. The Navy did pursue radar technology to the point that its BAT—a glide bomb with a wooden airframe and autonomous radar guidance—underwent a combat test and achieved several kills against merchant ships before the war ended.[12] The problem proved a little simpler at sea than over land because of the greater contrast between the target and the background and the absence of competing false returns.[13] Still, the lack of solid-state electronics and miniaturization limited what one could do in that day. Moreover, the coming of nuclear weapons at war's end so overshadowed conventional-weapons technology that the pace slowed even more than one would expect in the aftermath of a total war. Too, for a couple of years, the West assumed that the United Na-

tions would do it right, whereas the League of Nations had failed and war itself would become unthinkable in the foreseeable future.

Such limited gun and conventional-bomb development that had occurred in World War II came practically to a halt in the late 1940s, along with the many guidance programs. The highest-ranking airmen of the period felt that strategic bombing had been a—if not *the*—decisive factor. Some thinkers who had their doubts asserted that the intercontinental bomber, combined with the atom bomb, overcame the earlier shortcomings of the theories of the strategic bombing people and would prove decisive in future wars. Conventional bombsights, even the radar ones coming on just at the end of the war, would do for nuclear work—the lethal radius of the new bombs was so great that precision was not as vital as it had been with the high-explosive weapons. So in 1947, the combination of long-range bomber technology, the new nuclear weapon (thought deliverable only by large airplanes), and the wartime record of the air forces proved enough to sustain the doctrine of strategic bombing and therefore justify the creation of a new organization— the independent US Air Force. On the surface of things, it appeared that what we would today call a revolution in military affairs (RMA) had arisen.

In addition to its progress in weapons guidance, the United States reaped a rich technological harvest from Germany. Defeat is seldom so complete as it was for the Nazis, which enabled free access to Germany's archives and scientists at war's end. Most people know the story of our importation of the rocket scientists, and Operation Paperclip gathered a rich trove of scientific and technological information that would greatly boost aeronautical and weapons development.[14]

Current debates about RMAs often turn on questions of semantics, but many debaters would assert that the usual RMA consists of three elements. First, the implements of war would undergo a major technological change. However, that by itself would not be enough. Doctrine would have to recognize the new

technology, and then one would have to build organizations that would accommodate both the new technology and doctrine.[15] So it had taken 44 years to move from Kitty Hawk to the independent Air Force and to bring about a revolutionary new way of fighting wars: to leap right over armies and navies without defeating them to achieve victory through air attacks on the vital targets within the enemy homeland—or so went the argument.

Many people, especially in the other services, tended to deny that any revolutionary change had taken place. They argued that one still needed boots on the turf and command of the sea and that the most vital contribution of airpower in World War II was support of the land and sea forces. Germany did not collapse until after the infantry had crossed its borders, east and west. The Japanese did not throw it in until their armies and navies had suffered defeat in the field and the Soviet army had joined the fray. As regards economic factors, the submarine campaign had shut down Japanese industry before strategic bombing even started.

Although the doctrine of the new US Air Force insisted that strategic bombing alone could decide outcomes and that the new Strategic Air Command would prove decisive, the other services argued that the decision would have to come on the ground and sea. An air campaign could not win alone; furthermore, it could act decisively not as the supported force but only as a supporting element. The Truman and Eisenhower administrations both seemed to accept the Air Force version of things, but plenty of reasons existed to doubt that an RMA had really occurred.[16]

The Morning Twilight of the Guided-Weapons Age

The same generation that fought World War II fought in the Korean War—and used the same weapons for the most part. Air Force doctrine remained theory since it had not yet appeared in print, and the course of the war did not much resemble the way airmen in the late 1940s had envisioned conflict. The Berlin blockade and the Korean War began to cast doubt on the notion of the universal utility of atomic bombs. Rather, Korea seemed a tactical conflict, with B-29s having difficulty finding targets that even resembled the ones envisioned by theorists at the Air Corps Tactical School in the 1930s. The presence of seasoned veterans in the United Nations fighter forces enabled the domination of the air battle. The pilots had new jets, to be sure, but they made all their kills with the same guns that had armed World War II aircraft.[17]

We deployed guided RAZONs and TARZONs—12,000-pound Tall Boy bombs employing RAZON guidance technology—to Korea for combat tests, and developers saw reason for optimism although many operators thought them more troublesome than beneficial. Still dependent upon vacuum-tube technology, they were not very reliable. We dropped 30 TARZONs on Korean bridges during the war and several times took out a bridge with only one round. However, we lost two B-29s in the process, probably due to deficiencies in bomb design, and terminated the combat tests.[18]

Because Gen Omar Bradley and many others considered the Korean War an aberration, it did nothing much to undermine the administration's and the Air Force's focus on nuclear strategic bombing. The USSR had exploded a nuclear device in 1949, which caused a great hullabaloo, but we still had good reason to doubt the Communists' ability to deliver such weapons upon the American homeland. The one-sidedness of Korean air battles did not produce much action in weapons development, but considerable losses to ground fire for both the Air Force and Navy stimulated a desire to develop some standoff and additional accuracy in conventional weapons. Still, the greater part of the emphasis remained on intercontinental nuclear war (or deterrence) until the onset of the 1960s.

Because of the lack of radical change in either conventional-armament technology or tactical air doctrine, not many organizational revisions occurred in the 1950s. The overall

structure remained stable, although the powers of the secretary of defense saw some enhancement in 1949 and 1958. The Navy's conventional-armament research and development occurred in large part at the Naval Ordnance Test Station at China Lake, California, while the Ordnance Department of the US Army performed bomb and gun development for the Air Force.

A major change occurred in the Air Force in 1950. Researchers had expressed dissatisfaction with the unification of procurement and research and development functions under Air Materiel Command, arguing that supply people tended to dominate and repress innovation. The dollar value of supply operations, much higher than that of research and development, led to a focus on maximum productivity and, consequently, to incremental change. The researchers had their way in 1950 and got their own major command, the Air Research and Development Command, which focused most of its work on strategic air war, but some went on in the tactical realm as well.[19] One manifestation of that came in the airlift business with the acquisition in the 1950s of hundreds of C-124s and C-130s, both having major Army support functions but neither having much to do with nuclear war. As for conventional weapons, when sputnik went up, an attempt to establish an armament center at Eglin AFB, Florida, quickly aborted to allow the better concentration of financial and human resources on strategic-missile development.[20]

That did not completely end the development of conventional armament, though, because the Army brought one of the greatest aircraft guns in history—the M-61 Gatling gun—into operation in 1958, installing it as standard equipment in both the F-104 and F-105, both of which came on the line that year.[21] Toward the end of the Eisenhower administration, the Army Ordnance Department, still in charge of bomb development, also brought a new low-drag bomb series on the line: the 750 lb M-117 and the 3,000 lb M-118, both designed for external carriage on fighter bombers. The Navy also brought a low-drag bomb series onto the line at about the same time in the Mk-80 series, with 500 lb and 2,000 lb versions for Air Force use.[22]

Notwithstanding all the focus on strategic attack, air-to-air weapons enjoyed some important progress in the 1950s, the usual rationale pointing out that we would need these new weapons against hordes of enemy bombers coming across the North Pole. But the resulting weapons led the way into the missile age and proved adaptable to tactical air warfare. Ron Westrum has recently published a book on the most legendary of these weapons—the AIM-9 Sidewinder—and the organization that built it—the Naval Ordnance Test Station at China Lake.[23]

A Harvard graduate with a PhD in sociology from the University of Chicago and a professor at Eastern Michigan University, Ron Westrum worked for 13 years on his volume (*Sidewinder: Creative Missile Development at China Lake* [Annapolis: US Naval Institute Press, 1999]). He has written two other books—one on complex organizations and the other on sociology and society—both of which are out of print and neither of which is in the Air University Library. Westrum has also written a number of articles for periodicals. The Sidewinder volume depends heavily upon interviews, most of them concentrated among the veterans of China Lake. Thus, an oral-history purist might complain that his use of this material is on the uncritical side. Certainly, we cannot expect anyone to have immediate command of the complete literature on science, technology, and innovation—much less cite it in a single book—but Westrum clearly is erudite in his own field.

Organized along chronological lines, *Sidewinder* almost wholly addresses the development rather than the employment of this missile. It also advocates the decentralization of innovation so as to permit "technology push," which allows ideas to bubble up from below rather than come only in response to demand from above.

According to Westrum, the Sidewinder is a classic case of technology push, having emerged from a freewheeling community of

scientists and engineers in the 1950s—the golden years at China Lake. Encouraged to think freely, these people could work on things they considered useful, as well as on projects assigned from above. In such an environment, the Sidewinder project moved along rather swiftly. Because of the absence of a surrounding community and because everyone, including civilians, lived on the base in government quarters, they all knew each other in a far less formal setting than in larger, more established organizations. Too, the isolation of the desert community had the effect of magnifying the impact of personality and leadership.

On first glance, it might appear that Westrum worships Bill McClean, one of the China Lake leaders. If he does, then he has plenty of company. Born in 1914 and brought up and educated in California, where he graduated from the California Institute of Technology, William B. McClean worked on fuzes, among other things, at the Bureau of Standards during World War II until he moved to China Lake in 1945. By 1954 he had become technical director of the Naval Ordnance Test Station and had his finest hours during the ensuing decade, culminating in 1958 with President Eisenhower's awarding him a special gold medal for achievement in the creation of the Sidewinder. According to Westrum and many reports, McClean not only produced many ideas himself, but also was not too proud to quickly adopt those from other sources. He inspired free thinking and burned countless hours of midnight oil—luring many others to do the same.[24] Although we often tend to overrate the influence of individuals on institutions, that probably does not apply to McLean. Perhaps when he left the scene in 1967, his absence had more to do with the perceived decline of China Lake than with any of the other factors Westrum cites.

The simplicity of the Sidewinder—one of its beauties—makes it cheaper to buy in numbers, smaller and lighter than many similar weapons, and more reliable and easier to maintain than complex mechanisms. This simplicity also makes for easy adaptation to new airplanes as they come along. Further, its operation does not depend upon extensive equipment aboard the aircraft or upon complex launching procedures. Thus, the

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The simplicity of the Sidewinder—one of its beauties—makes it cheaper to buy in numbers, smaller and lighter than many similar weapons, and more reliable and easier to maintain than complex mechanisms.

Sidewinder reached its initial operating capability in 1956 and got its first kill in 1958 aboard a Chinese Nationalist F-86.[25]

When the new missile went to war in earnest, in Vietnam, it proved a little disappointing—even with a kill ratio far higher than that of all other air-to-air missiles. Designed to attack nonmanuevering bombers, the Sidewinder nevertheless lent itself to improvements that would make it more suitable for use against agile, very fast fighters. Because first-generation seekers could only lock onto the hot exhausts of jets, the attacker would have to maneuver his plane into a narrow cone behind the target before he could get a lock-on signal. A maneuvering target varied the shape of the cone in weird ways. Too, an alert enemy could see Sidewinder smoke at a long distance and could possibly outturn the missile as it closed in. Flares could spoof early versions, which sometimes would home in on the sun or hot spots on the ground, rather than the target. Ultimately, scientists solved all of these problems so that the later models—the AIM-9L and AIM-9M— proved far superior and had much better kill records in the Falklands conflict, the Bekaa Valley fighting, and the Gulf War than did their predecessors in Vietnam.[26] The current AIM-9X program seeks to develop the missile even further by employing thrust vectoring and helmet-mounted sights to close gaps that

have developed with the latest Russian and Is-raeli missiles. Those innovations, together with much wider gimbal limits, yield a new and impressive off-boresight capability (the ability to shoot at something not directly ahead of the airplane).[27]

Westrum laments, however, that China Lake is not what it used to be. He doesn't go into some of the other worthy programs developed there in the golden era: Walleye electro-optical bombs and Shrike antiradiation missiles, among others. But, relying heavily on the memories of the China Lake veterans of those days, he complains that constraints imposed by rules and regulations and centralized control have bureaucratized the place and made it far less adventurous than before. The genius of the old leadership is not quite so apparent lately. It has become more a supporter of innovative research done elsewhere (in industry) than the developer of major weapons on its own.

Undoubtedly, the golden age produced good work, China Lake benefited from good leaders, and we recognize the Sidewinder as one of the most successful weapons in American history. Yet, the skeptic might wonder whether the author is unduly swayed by the sentiments of the veterans of yesteryear. Similar things happen in other organizations and technologies. The original LGB is a case in point. With Eglin AFB and Texas Instruments doing the work, the first versions were a great leap forward—and so were the second. But by the time we got around to Paveway III, the most obvious improvements had already been made, and further advances did not yield so much gain despite costing somewhat more. In other words, we had reached the point of diminishing returns. More than likely, that sort of thing may have changed China Lake more than any diminishment in imagination or leadership.

Notwithstanding the inevitable limitations of any single book, *Sidewinder* is a useful tome, and the air warrior/scholar would profit from reading it. Westrum could hardly have written the whole story of China Lake in one volume, and he would have been hard put to better place the story in its larger context by ex-panding his research into arenas concerning Washington, foreign policy, and the other military services. This book is a worthy contribution to the sparsely populated area of serious research into the history of conventional weapons.

Disappointments of the Fight above Vietnam

The apparent ease of victory in the air-superiority battle over Korea had made both the American public and airmen complacent. Accident rates in World War II and for a decade afterwards were horrific indeed. Something had to be done. The flying-safety programs of the American services had their effect: flying F-15s today is much safer than flying B-25s in the early 1950s. We can thank better flying discipline for this achievement—but apparently at a cost of diminishing the quality of air-to-air training in the fighter world before Vietnam. Specifically, commanders of the late 1950s and beyond became so fearful of accidents that they imposed unrealistic restrictions on training for air combat.[28]

To some degree, the experience of the Navy F-8 Crusader squadrons, which came away with the best air-to-air record of all units engaged in the struggle for command of the air, supported that notion. That is, because the Crusaders had no other mission, their training program focused on the air-to-air battle. The fact that the F-8's weapons included only internal guns and Sidewinder missiles may also have had something to do with it.[29]

Some of the literature of the late 1950s enthusiastically endorsed the potential of missiles. One article asserted that if a pilot came back to claim a gun kill, he would have failed to apply his missile weapon properly—otherwise, he would have certainly killed his enemy long before he got into gun range.[30] But it did not turn out that way in combat. For many reasons, both the radar missiles and the heat seekers had very low kill ratios—about one kill out of 10 for the radar Sparrow and
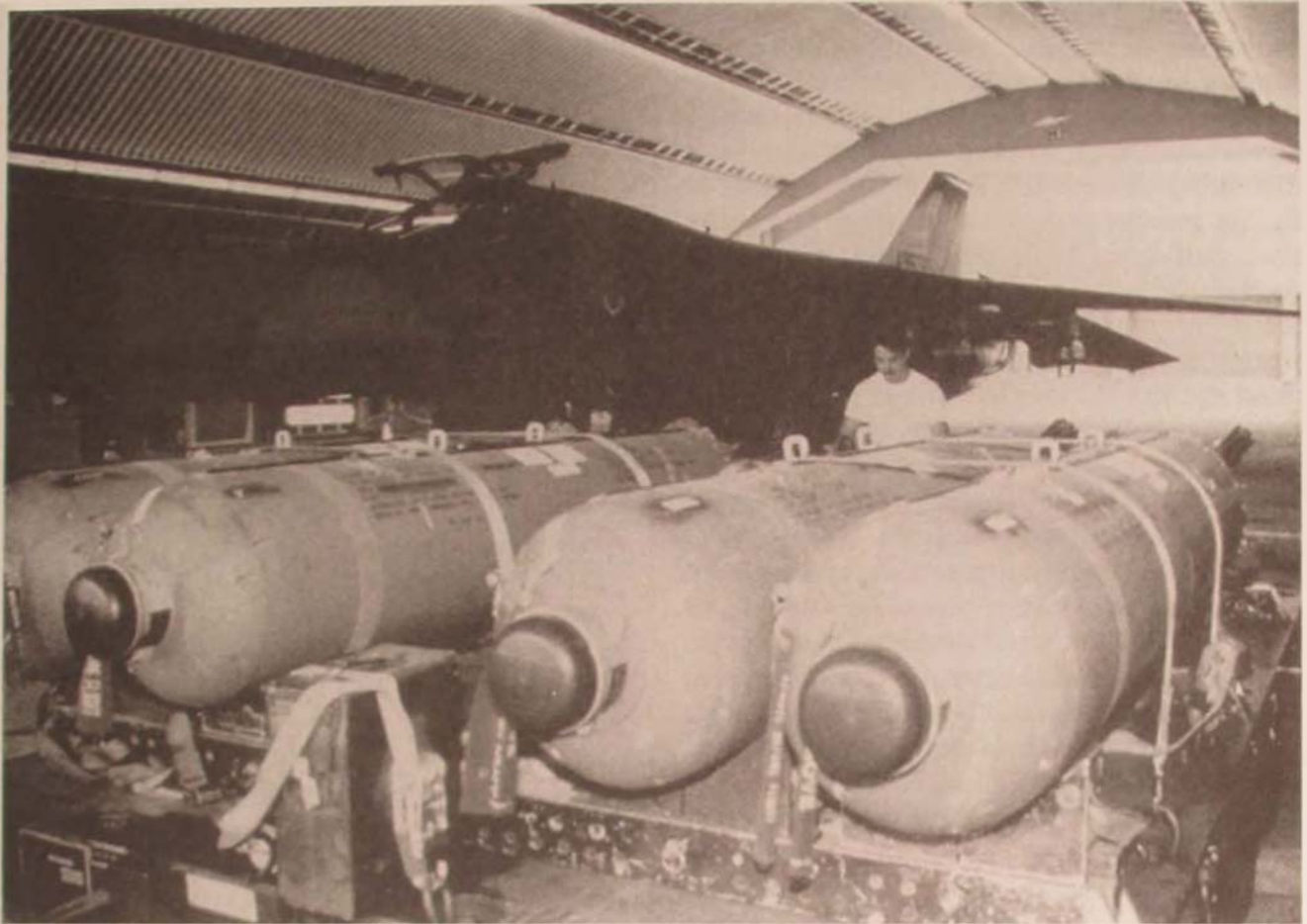
US air forces are amply equipped with cluster bombs loaded with a wide variety of submunitions and mines. Shown here are standard dispensers ready for loading onto an F-111 in the Gulf War. They often come with proximity fuzes that open the dispenser at some altitude to release a host of small submunitions over a wide area—so many, in fact, that even a very small dud rate can leave a dangerous residue. This sometimes leads both the public and the media to oppose their use. (Photo courtesy of Col Mason Carpenter, USAF)

close to two out of 10 missiles fired for the infrared Sidewinder. These figures were skewed somewhat because pilots sometimes fired two missiles at one target, fearing that the unreliablity of one or the other's electronic components would deny them the kill. Also, they sometimes launched weapons when they knew they were outside the firing limits to make their enemies turn—friendly fighters could then catch up with them by cutting them off and shoot them down with guns. In any event, because of the missiles' disappointing performance, some people proposed improving their technology or building specialized air-to-air combat training ranges and

loosening the rules for that training in both the Navy and, later, the Air Force.[31]

Air-to-ground attack in Vietnam was also disappointing. Clearly, the interdiction campaign did not shut off the flow of goods to the south, but the Army expressed more satisfaction with the close air support (CAS) it received in Vietnam than in earlier wars.[32] Probably, this had little to do with the technological quality of the weapons used for the purpose.[33] Aircraft used unguided bombs during most of the war and experienced difficulty acquiring targets under the jungle canopy. This problem would have persisted even had they found it easier to identify targets in the jungle or under the protection of darkness.

The Bull Pup missile, available from the beginning of the war, featured guidance very similar to that of the RAZON. The pilot would visually track the flare in the tail of the missile and send orders correcting its course through a radio data link. But the pilot had to fly the missile and the airplane at the same time and keep both pointing at the target during the weapon's time of flight—no easy feat when flying down the gun barrels of an alerted and angry enemy. Too, the small warhead did not do much damage even when it scored a hit.[34] China Lake managed to get the Walleye electro-optical weapon into service by 1967, but the bombing halt prevented it from having an important effect.[35]

Meanwhile, the people at Eglin had been working with a new phenomenon—laser light. By 1967 they had developed a weapon, much simpler and cheaper than Walleye, that could be guided precisely upon a spot of laser light reflected off a target. Combat testing with kits on standard Mk-82 500 lb and M-117 750 lb bombs in the spring and summer of 1968 showed clear promise of a radical improvement in bombing accuracy—and at a relatively low price. By 1972 the testers had gone back to Eglin and adapted their laser-guidance kits to Mk-84 2,000 lb and M-118 3,000 lb bombs so that the new precision could work mayhem on the North Vietnamese Easter Offensive in 1972. The kits cost less than $10,000 apiece and brought huge economies that repaid their price many times over. Too, infrared sensors aboard AC-130s, OV-10s, and F-4s could point laser designators so that the combination began to remove the enemy's sanctuary of darkness.[36]

However, those things did not have much effect on tactical doctrine then or in the following decade and a half before the Gulf War. But airmen's traditional preference for the offensive had received a boost because PGMs had begun to swing the balance away from ground-based defenses in favor of the aerial offensive. The "shooters" had become so much more efficient at hitting targets that the burden of supporting forces in the way of numerous fighter escorts and suppression of enemy air defenses

(SEAD) aircraft became much less onerous than it had been for most of the war.

The Maturation of Precision Guidance at Century's End

In the years following the Linebacker operations in the Vietnam War, the chief combat experiences included the October War of 1973 as well as the Falklands campaign and the Bekaa Valley fighting of 1982. Those experiences seemed to strongly indicate that missiles had become the dominant weapons of the air war—that technology had overcome the limitations of the Vietnam struggle. Guns had made all of the kills in the Arab-Israeli War of 1967, whereas both guns and missiles had registered kills in the October War. But missiles enabled practically all of the air-to-air victories in the Bekaa Valley and Falklands fighting. The rules of engagement for radar missiles were less restrictive than they had been in Vietnam, and missile reliability had increased enormously. Improvements to the Sidewinder made it practically an all-aspect weapon that pilots could fire in head-on attacks. Although other factors contributed to the outcomes in both the Bekaa Valley and the Falklands, the air-to-air missile clearly had come of age.[37]

A few Maverick missiles made it to the Israeli forces in 1973, but, notwithstanding President Anwar Sadat's claim that these were what defeated him, they came so late and in so few numbers that they could not have made much of a difference. So PGMs did not have much of an effect then.[38] However, the British used some with good effect in the Falklands war, and they played an even more prominent role in the Bekaa Valley fighting. Although still too early to claim predominance for PGMs in the ground battle, it seemed clear enough that the balance was changing.

American tactical air doctrine had not changed very much prior to the Gulf War, notwithstanding the progress made in both air-to-air and air-to-surface weapons. It remained largely the same as it had in the 1943

version of Field Manual 100-20, *Command and Employment of Air Power:* air superiority came first, usually followed by interdiction, and finally CAS, except in the case of a ground emergency. After his forces had provided for all those things, the commander could turn to reconnaissance and tactical airlift. He would have to command in a centralized way at the theater level and be colocated with a coequal ground commander. Those ideas, in fact, dated all the way back to Mitchell in the 1920s, if not to World War I itself.

In the case of the Navy, we have seen that the organization of aircraft-armament development has had more or less a continuous history at China Lake (and other places) since World War II at the latest. We also noted that, for a short time in the 1950s, a dedicated aircraft nonnuclear-armament unit existed at Eglin AFB, but it disappeared in 1957. However, by 1964 the responsibility for bomb development had migrated from the Army to the Air Force, and the requirements of the Vietnam War further contributed to the need for organizations to handle that responsibility. Founded in 1964 at Eglin, one such organization, Detachment 4 of the Research and Technology Division of Air Force Systems Command at Wright-Patterson AFB, would eventually become the Air Force Armament Laboratory and now the Armament Directorate (at Eglin) of the Air Force Research Laboratory, also at Wright-Patterson.[39]

At about the same time, a special unit of the Aeronautical Systems Division of Wright-Patterson was established at Eglin AFB. Known as Detachment 5, it evolved into the Armament Development Test Center, the Armament Division, and finally the Munitions Systems Division.[40] Thus, the Air Force again had an organized and dedicated unit that could become the advocate for the development of advanced munitions.

Like all wars, the Gulf War of 1991 was unique. By then, precision guidance in weapons for both the air battle and the one on the ground had become so prominent that many people began to think that doctrinal change would have to follow. The air bat-

tle ended in a trice, again with practically all of the kills falling to missiles. The combination of jamming, lethal SEAD, and stealth

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Precision guidance, along with the many other technological advances affecting airpower, now required doctrinal change, which in turn would demand organizational changes as well.

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seemed to have brought the threat from surface-to-air missiles under control. Although the addition of the powered AGM-130 and the GBU-15 television and infrared guided bombs had enhanced the inventory of air-to-ground weapons, laser-guided weapons available at the end of the Vietnam War accounted for the lion's share of precision attack. But the forward-looking infrared radar (FLIR) and low-altitude navigation and targeting infrared for night (LANTIRN) equipment made the LGBs as usable in the darkness as in the daytime. Combined with stealth, they removed the night sanctuary of the enemy and made darkness the friend of the aerial offensive.[41] The victory over Saddam Hussein was so quick and so painless that some people began to assert that important doctrinal changes would have to come soon.

The attack on Schweinfurt, Germany, in 1943 seemed to teach us that we would always have to achieve air superiority first before airpower could turn to its other missions. During the Gulf War, people began to say that the PGMs made each sortie so much more effective that we might look beyond sequential to parallel attack. Having to use hundreds of bombers to reliably hit one target made a sequential (step-by-step) campaign mandatory. But the fact that one shooter could now take out multiple targets made it feasible to undertake strategic attack and interdiction campaigns simultaneously (in parallel) with the struggle for air superiority. According to the

most enthusiastic airmen, this also made it practical to so change doctrine that airpower could sometimes become the supported force while armies and navies assumed the supporting role. Sometimes, they said, airpower alone could achieve national objectives.[42]

Precision guidance, along with the many other technological advances affecting airpower, now required doctrinal change, which in turn would demand organizational changes as well. Many airmen said it was time for the other services to recognize the validity of the central control of airpower at the theater level. It was time, too, for the Army and Navy to concede the wisdom of sometimes having an airman serve as the geographical commander in chief. But many people in the other services were not ready to make such concessions. Boots on the turf and command of the sea had to remain the primary considerations, even though everyone admitted that air superiority was important, even essential, to all other operations. Some of them argued that the Gulf War had been a fluke, a nontest. The terrain and climate, so favorable to airpower, and the enemy's ineptitude made the whole thing meaningless. Any strategy would have won in those conditions.[43] Besides, the argument went on to assert that the degree to which the bad weather in the Gulf had inhibited the air campaign proved that airmen still did not have a handle on that sanctuary. One could not count on the air campaign to protect the other forces and assist them in the ground battle because changes in the weather could shut down or severely limit air operations.

Insofar as conventional air armament is concerned, the reaction to the Gulf War's "lessons" seemed more rapid than usual. It had long been understood that weather could inhibit the effective use of all the precision weapons in the inventory. Even before the Gulf War, at Eglin AFB, an inertially aided munitions program had promised simplicity, economy, and a way to overcome weather limitations. Outgrowths of Operation Desert Storm included the joint direct attack munition (JDAM) program, which had received a boost from the combat experience. The idea

entailed providing a relatively simple kit consisting of an inexpensive inertial measurement unit (IMU), a GPS receiver, and a tail-control unit, all of which mounted on standard 2,000 lb bombs already in the inventory in large numbers.[44] By the time of the Kosovo campaign, JDAM had already entered low-rate initial production and had received certification for use aboard the B-2. The Air Force became the lead service in that development.

Meanwhile, the Navy led a contemporary program using similar principles to develop the joint standoff weapon (JSOW), a bit more complex than JDAM because of its folding wings and its ability to carry submunitions to a target from a range considerably greater than that of JDAM. In any event, the latter carries only unitary warheads, whereas JSOW will not have one until it reaches a later phase of development.[45]

Because neither of the weapons has a terminal seeker, neither can achieve the same degree of precision as an LGB, a GBU-15, or a Maverick. But the requirements demanded of the development called for 10-meter accuracy—rather good for a 2,000 lb warhead (the JSOW's is about 1,000 lb). Because both depend on guidance from an IMU corrected for drift by GPS, aircraft can drop them through the clouds with good assurance that they will impact within 30 feet of the target.

Although we used only a few JSOW's in the Kosovo campaign, B-2s dropped the JDAM in considerable numbers and with great success. By the time of the Kosovo fighting, the unit cost of the kits had gone down to about $18,000, so the Air Force and Navy could purchase them in large numbers. Thus, we have made a very substantial start on one of the Gulf War problems—penetrating the weather sanctuary.[46] As things stand at the end of the Balkans fighting (assuming that it has ended), some limitations exist. Both JSOW and JDAM depend upon good real-time target-location intelligence, and once they leave the airplane, they become autonomous—without a human in the loop. That situation complicates the bomb-damage-assessment problem

and in some situations carries a risk of collateral damage.[47]

The air-to-air weapons of the Gulf War seemed more than adequate, and by the time of Kosovo, we had added AMRAAM, which increased the West's advantage in the air battle. Although Israel and Russia both possessed short-range infrared missiles combined with helmet-mounted sights, those technologies were not available to the enemy over Serbia. The dominance of the air-to-air battle turned out to be as complete in the Balkans as it had been in the Gulf War.

Did the Gulf War affect US Air Force doctrine in response to the combat experience with the new conventional-weapons technology? The 1992 version of basic doctrine appeared after the war but had been completed before the fighting began. We might take that as a baseline at the end of the cold war. The Air Force Doctrine Center, set up in the aftermath of Desert Storm, has produced a set of doctrine manuals, including basic doctrine, counterair, counterland, and countersea, among others—all attractive, well scrubbed, and easy to use. They mention some things associated with the 1991 war, such as parallel attack, but do not emphasize them to the point of reflecting a major change in doctrine. The basic elements seem about the same as they have been since the 1920s, although the vocabulary differs somewhat, as does the framework for their presentation. Perhaps that is as it should be. Ideally, doctrine should concern the eternal truths—the generic things that, hopefully, would apply to all cases. Strategy, on the other hand, is optimized for the particular case at hand and is thus much more perishable than doctrine.

As pointed out above, most people consider the Gulf War unique, and it would be reckless to base "eternal verities" on a sample size of one. Since wars, blessedly, do not occur frequently, inferences drawn from them and made into elements of doctrine can change only slowly. In some ways, one may say that the Kosovo campaign doubled our sample size, albeit still very inadequately. Does it reinforce any of the armament "lessons" of the

Gulf War? Perhaps. It certainly suggests that PGMs are important and destined to become more so. It also adds to the evidence that, at least for now, the night sanctuary for the adversary is no more. Kosovo confirms the difficulty of acquiring mobile targets such as Scud missile launchers and of destroying them. It confirms that the air-to-air part of the air superiority campaign is well in hand but that the SEAD portion of counterair perhaps needs more work. Airborne SEAD assets need replenishment, and the Serbs' tactics of avoiding radio-frequency emissions suggest that we need a weapon that does not depend on radiation for guidance to hit ground-based defenses.[48] Some air enthusiasts argue in favor of a place in doctrine for air-alone campaigns, but one finds the notion hard to sustain with Kosovo evidence. Not only does it represent just a sample of one, but also the evidence as to why Slobodan Milosevic quit remains too ambiguous to make the assertion at this point. Maybe Kosovo does reinforce the idea that airpower can sensibly become the supported force in some conflicts.

Have combat experience, technological advances, and new doctrine manuals resulted in organizational change? True, about the time of the Gulf War, organization for the employment of Air Force airpower radically changed. We concentrated combat airpower into one command—Air Combat Command (except for airpower assigned to a new joint command—US Strategic Command—and to the Air Force's Special Operations Command). But that did not arise from either the Gulf War or the improvement in munitions. It was afoot earlier than that, and the notion dates all the way back to the General Headquarters (GHQ) Air Force of 1935.[49] About the same time, the organization for conventional-weapons development also changed. First, the reforms of 1950 became undone with the merger of Air Force Systems Command with Air Force Logistics Command to form a new Air Materiel Command—which reunited the research and development function with the procurement apparatus. But this, too, arose from sources other than the

Gulf War and improvement in armament technology. Rather, the rationale held that it would simplify the process and make for more efficiency—and reduce the force structure. At the same time, the Munitions Systems Division at Eglin was abolished, and its functions rolled back into the Aeronautical Systems Division (later Center), an arrangement that lasted only a short time—until 1998. Then the armament-development function again departed the Aeronautical Systems Center, moving back to Eglin under a new command, the Air Armament Center, which had responsibilities for armament development beyond those assigned to the Munitions Systems Division. Possibly, we can attribute this one change to the performance of PGMs in the Gulf War and to their rising importance to air warfare.

Implications for the Future

Secretary of Defense William Cohen and Department of Defense acquisition chief Jaques Gansler argue that perhaps it is time to reduce our emphasis on platforms and to increase emphasis on smart weapons. It is hard to argue with that point. No American can regret the absence of combat casualties in Kosovo. Were that emphasis to increase and continue, we probably would need more exact intelligence. Less clear is the argument that gradualism is bad. Many military people came out of the Kosovo experience asserting that, in comparison to the Gulf War, it proved that Instant Thunder is the way to go. But it also seems clear that the United States will usually have to operate in coalitions in order to retain the legitimacy that comes from the approval of international organizations. That being the case, we need consensus to achieve unity, and the consequent delays probably will mandate a more gradual approach to targeting than many airmen would like.

Since the end of the Gulf War, many people have asserted that smarter adversaries than Saddam will not confront a Western coalition in a conventional battle but will employ asymmetrical means.[50] To some extent, it appears that the Serbs got the message, keeping their integrated air defense system from emitting and using it as sort of a force in being. They also mixed civilians amongst their military convoys—an idea as old as the hills. The Vietnamese certainly used it up until the spring of 1972, when they launched a conventional campaign.

The implications of that tendency probably need more study. Certainly, it is better to have PGMs in an asymmetrical contest than not to have them. Long-term efforts have attempted to devise a means of finding targets in a guerrilla context under jungle canopy, and current studies seek to identify the special-munitions requirements of urban warfare. Here, too, precision is much to be desired.

The United States has long had an edge in cluster weapons, the use of which some people oppose—especially mines. Area weapons have less accuracy than PGMs by definition. Are there political means of protecting that advantage? Are there technical means of overcoming the difficulty? Or must we plan our campaigns without the use of these effective weapons? Can potential adversaries use the "Cable News Network effect" to neutralize our huge inventory of these expensive and efficient weapons? Have airmen become the victims of their own successes? Both the Gulf War and Kosovo proved so economical in terms of our own casualties and in collateral damage to enemy civilians that they may have caused the public to have unrealistic expectations that we cannot meet next time. Do we have a public-affairs policy that can overcome that problem? The technical means of avoiding losses and collateral damage has improved so much since Vietnam that the region of diminishing returns may not be far off. How can we change our developmental and employment doctrines to diminish these difficulties?

If our cluster munitions are becoming less usable because of public opinion, perhaps our other conventional weapons, especially PGMs, are becoming more important to US and world security. Paul Nitze, a doyen of strategic thought, has written that perhaps the time is coming when we can base our deterrence upon

strategic conventional weapons instead of nuclear missiles and bombs.[51] He argues that we may have needed our nuclear weapons in deterring Soviet nuclear forces, but they have had little utility in dealing with various regional adversaries. Rather, some of the latter have sensed that the very destructiveness of nuclear weapons inhibited our president's choice of using them—the humanitarian cost was simply too high. Thus, these adversaries acted against our interests with impunity. However, Nitze now wonders if the potency of long-range precision attack will bring us closer to using such PGMs to deter adversaries other than major nuclear powers.

Conventional weapons have become so precise and destructive that they can do many of the things that heretofore resided only within the capabilities of nuclear bombs and missiles. So, Nitze argues, because of their precision and ability to limit collateral damage, we might possibly use them with far less inhibition than has been the case with the nukes. Thus, because of their greater usability, perhaps strategic conventional precision weapons can serve to deter regional powers bent on acting against our wishes. Nitze does hedge to the extent that we would have to maintain our dispersed and potent nuclear formations because it will be a long time before our conventional weapons could take out a major nuclear arsenal. However, the rising utility of strategic conventional weapons could conceivably lead to a less threatening world. Perhaps, then, the use of the B-2/JDAM combination is only an indicator of things to come.

We end this article by providing a starter list of books for your professional reading program—a particularly difficult feat in this area. The libraries are full of published works on nuclear weapons, airplanes, engines, strategic missiles, and whatnot. But precious few discuss conventional bombs, guns, and missiles, and still fewer relate their technologies to doctrine and organization for development or employment. To develop in-depth expertise, the reader certainly would have to turn to unpublished material and periodical literature. Thus, more so than is usually the case, the sampler that follows is not a definitive bibliography but only a starter list for the generalist air warrior/scholar. □

A 10-Book Sampler on the *Force* in US Air Force

Two for an Overview

Ideas and Weapons: Exploitation of the Aerial Weapon by the United States during World War I by Dr. Irving B. Holley Jr. New Haven, Conn.: Yale University Press, 1953.
Not dedicated to conventional armament but a classical reading on the process of developing weapons and the doctrine and organization to go with them.

Winning the Next War: Innovation and the Modern Military by Stephen Rosen. Ithaca, N.Y.: Cornell University Press, 1991.
Not about the special area of conventional aircraft weapons but dedicated to the process of innovation in weapons development and other areas. Every air warrior/scholar should know this book.

Eight for Greater Depth

The Evolution of the Cruise Missile by Kenneth P. Werrell. Maxwell AFB, Ala.: Air University Press, 1985.
Recent and authoritative.

International Missile and Spacecraft Guide by Frederick I. Ordway III and Ronald C. Wakeford. New York: McGraw-Hill, 1960.
Quite dated now but contains good material on the guidance research that went on for bombs and missiles in World War II.

Aircraft Armament by Louis Burchiss. New York: Aerosphere, Inc., 1945.
A comprehensive treatment of the standard air-to-air and air-to-ground armaments of World War II.

The Illustrated Encyclopedia of Aircraft Armament: A Major Directory of Guns, Rockets, Missiles, Bombs, Torpedoes and Mines by Bill Gunston. New York: Orion Books, 1988.
A coffee-table book but generally accurate and fairly comprehensive.

Air Warfare in the Missile Age by Lon Nordeen. Washington, D.C.: Smithsonian Institution Press, 1985.
Covers more than just conventional weapons but contains accurate and interesting information on them. After updating it, Smithsonian will republish it very soon.

The Ordnance Department: Planning Munitions for War by C. M. Green, H. C. Thomson, and Peter C. Roots. The United States Army in World War II: The Technical Services (series). Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1955.
Deals with munitions in general but has authoritative material on air weapons. The scholar should certainly be aware of this model official history, one of many volumes in the US Army's "Green Book" series on World War II.

The Gatling Gun: 19th Century Machine Gun to 21st Century Vulcan by Joseph Berk. Boulder, Colo.: Paladin Press, 1991.
Since the M-61 arms all our fighters in the Air Force and Navy (except the F-117), the scholar should be familiar with this book.

U.S. Naval Weapons: Every Gun, Missile, Mine, and Torpedo Used by the U.S. Navy from 1883 to the Present Day by Norman Friedman. Annapolis: Naval Institute Press, 1982.
Contains much still-relevant material and has a short but very good section on nonnuclear aircraft armament.

One for Good Measure

From Crossbow to H-Bomb by Bernard and Fawn Brodie. Bloomington, Ind.: Indiana University Press, 1973.
Has a far larger scope than the subject of this article, but it is a classic, though dated. The modern professional should be familiar with it.

Notes

1. James J. Hudson, *Hostile Skies: A Combat History of the American Air Service in World War I* (Syracuse, N.Y.: Syracuse University Press, 1968), 135, footnote.
2. Ibid.; and George W. Chinn, *The Machine Gun*, vol. 1 (Washington, D.C.: Government Printing Office [hereinafter GPO], 1951), 314–15, 284.

3. Benedict Crowell [assistant secretary of war for munitions in World War I], *America's Munitions, 1917–1918* (Washington, D.C.: GPO, 1919), 300–305; and C. M. Green, H. C. Thomson, and Peter C. Roots, *The Ordnance Department: Planning Munitions for War*, The United States Army in World War II: The Technical

Services (Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1955), 452.

4. S. R. Stribling, "Bombs and Bomb Fuzes," *Army Ordnance* 9 (March–April 1929): 329–34.

5. "Aircraft Armament Division Notes," *Army Ordnance* 1 (March–April 1921): 290; and "Aircraft Armament Division Notes," *Army Ordnance* 1 (May–June 1921): 360–61.

6. Gen Carl A. Spaatz, memorandum to all major commands and staff sections, Headquarters Army Air Forces, no subject, 1 April 1947, with attached testimony on Senate Bill 758, pp. 63–88, in box 266, Spaatz Papers, Manuscripts Division, Library of Congress; and Maj John S. Hardy, "Development of Conventional Fighter Weapons" (thesis, Air Command and Staff College, Maxwell AFB, Ala., June 1967). Hardy, who had been a test pilot at Eglin AFB, Fla., prior to attending Air Command and Staff College, speaks of the Air Force approach to doing its research, development, and testing of armament via contract, as opposed to the Navy's use of in-house resources. See also Lt Col Kenneth Rasmussen, "The Munitions of Airpower in Southeast Asia, 1964–69" (Maxwell AFB, Ala.: Corona Harvest Project Office, Aerospace Studies Institute, January 1970), US Air Force Historical Research Agency, Maxwell AFB, Ala., file no. K239.0370-2, p. 5. Rasmussen points to the traditional dependence of the Air Force on the other services for weapons development and supply as one of the reasons for shortfalls in both the acquisition and shipping of munitions. See also US Air Force Systems Command, Munitions Systems Division, "History of the Munitions Systems Division/Air Force Development Test Center, 1 October 1989–30 September 1990," vol. 1, 17–22 (copy in History Office, Air Force Development Test Center [AFDTC], Eglin AFB, Fla.). This history gives an overview of the progress or lack of progress in the Air Force's armament acquisition after World War II.

7. John W. R. Taylor, ed., *Combat Aircraft of the World from 1909 to the Present* (London: Paragon, 1969), 540–41; and Marcelle Size Knaack, *Encyclopedia of US Air Force Aircraft and Missile Systems,* vol. 1, *Post–World War II Fighters, 1945–1973* (1978; new imprint, Washington, D.C.: Office of Air Force History, 1986), 53–66. After the 20 mm M-39 tested unsatisfactorily aboard late-model F-86Fs in Korea, the airplanes were retrofitted with .50-caliber M-3s. The F-86H, the first Air Force fighter with the 20 mm standard, did not come on the line until after the Korean War.

8. Albert N. Garland et al., *The Mediterranean Theater of Operations: Sicily and the Surrender of Italy,* United States Army in World War II (Washington, D.C.: Chief of Military History, 1965), 532–33; Charles H. Bogart, "German Remotely Piloted Bombs," US Naval Institute *Proceedings* 102 (November 1976): 62–68; and Alfred Price, *Luftwaffe: Birth, Life and Death of an Air Force* (New York: Ballantine, 1969), 106–7.

9. Werner Baumbach, *The Life and Death of the Luftwaffe* (New York: Ballantine, 1960), 104–8; Bogart, 62–68; and Price, 106–7.

10. US Army Air Forces, "Controlled Missiles," Project no. GP 5 (Orlando, Fla.: US Army Air Forces Board, 29 October 1943), copy in Technical Library, Eglin AFB, Fla., no. 2416, 1–7.

11. James Phinney Baxter III, *Scientists against Time* (Boston: Little, Brown, 1946), 198–99; and Wesley Frank Craven and James Lea Cate, eds., *The Army Air Forces in World War II,* vol. 6, *Men and Planes* (1955; new imprint, Washington, D.C.: Office of Air Force History, 1983), 258–59.

12. There is a splendid sample of the BAT in the Naval Air Warfare Center's museum at China Lake, California.

13. Albert B. Christman and J. D. Gerrard-Gough, *History of the Naval Weapons Center,* vol. 2, *The Grand Experiment at Inyokern* (Washington, D.C.: Naval History Division, 1978), 277–79.

14. Linda Hunt, *Secret Agenda: The United States Government, Nazi Scientists, and Project Paperclip, 1944–1990* (New York: St. Martin's, 1991).

15. See, for example, Michael O'Hanlon, "Can High Technology Bring the Troops Home?" *Foreign Policy,* Winter 1998/

1999, 72–89; and Eric R. Sterner, "You Say You Want a Revolution in Military Affairs?" *Comparative Strategy* 18 (October–December 1999): 297–308. For an authoritative, recent treatment, see Lawrence Freedman, *The Revolution in Strategic Affairs,* Adelphi Paper 318 (New York: Oxford, 1998). For a more skeptical view, see R. L. DiNardo and Daniel J. Hughes, "Some Cautionary Thoughts on Information Warfare," *Airpower Journal* 9 (Winter 1995): 69–77.

16. One of the best books in the huge literature on the debates among the services in the late 1940s is Jeffrey G. Barlow's *Revolt of the Admirals: The Fight for Naval Aviation, 1945–1950* (Washington, D.C.: Naval Historical Center, 1994).

17. The most authoritative book on the Air Force's role in the Korean War is Robert Frank Futrell's *The United States Air Force in Korea,* rev. ed. (Washington, D.C.: Office of Air Force History, 1983). For the naval dimension of that war, see the aviation chapters in Malcolm W. Cagle and Frank A. Manson's *The Sea War in Korea* (New York: Arno, 1980).

18. US Air Force, Air Proving Ground Deputy for Operations, Eglin AFB, Fla., "An Interim Report on Air Proving Ground and Other Experimental Activities in Support of Korean Operations," 5 September 1951, copy in Air Armament Center/HO files, no. 25A-1-2; US Army Air Forces, Air Proving Ground, "Operational Suitability Tests of the Tarzon Air-to-Surface Guided Missile," 13 August 1951, 320–22 (copy in Technical Library, Eglin AFB, Fla., no. 5999); and Futrell, 320–23.

19. Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960,* vol. 1 (Maxwell AFB, Ala.: Air University Press, 1989), 276–78; and US Air Force, Air Force Systems Command, Armament Division/HO, Eglin AFB, Fla., to Armament Division scientific advisor, letter, subject: Mission Study of the Armament Division, 3 August 1984, with one attachment (copy on file at Air Armament Center/HO, Eglin AFB) (hereinafter Mission Study).

20. US Air Force, Air Proving Ground, "The Proving Ground's Role in the Air Force Missile Development Program," 1 December 1957 (copy at Air Armament Center/HO, file no. 25A-1-1).

21. The same gun arms all US fighters today except the F-117. The F-22 carries a modified version of the M-61.

22. In 1967 Maj John S. Hardy lamented the slow development of armament but cited both the 20 mm M-39 (in the F-100 and F-5) and the M-61 (in all other current and subsequent US fighters) as exceptions. Hardy, 2. Redesign of the tail fin to reduce drag and increase the reliability of safe separation from the aircraft made even the World War II inventory usable aboard the F-100 and fighters of the late 1950s. US Air Force, Air Command and Staff College, *Air Weapons* (Gunter AFB, Ala.: Extension Course Institute, 1957), 9. One report shows the Mk 80 series ready for action even before the election of 1960 and the coming of the doctrine of Flexible Response with the Kennedy administration. US Navy, Bureau of Naval Weapons, "Free-Fall Nonnuclear Ordnance RDT&E [Research, Development, Test & Evaluation] Program," 9 September 1960, 2. Capt Martin J. Loftus speaks of both the M-117/M-118 and the Mk 80 series as being standard on US Air Force fighters before the passage of the Tonkin Gulf Resolution. He does note the presence of the AN series of World War II bombs in the inventory; when carried on fighters, they had to be used with the new low-drag conical fins rather than the World War II box-type fins. "Tactical Non-Nuclear Weapons," *Fighter Weapons Review,* June 1964, 20–28. In a 1962 study, R. S. Titchen and P. E. DePoy show that the Bull Pup guided missile, Rockeye shaped-charge submunition, Walleye TV bomb, and Shrike antiradiation missile were either in development or in the inventory before the frustrations of Vietnam or the impact of Flexible Response could have stimulated the services into action. "Conventional Ordnance for Aircraft Use,

1962–67," interim research memorandum, Operations Evaluation Group, Washington, D.C., 8 January 1962.

23. Now known as the Naval Air Warfare Center, Weapons Division.

24. In addition to the many citations Westrum provides, see also US Navy, Naval Air Warfare Center Weapons Division, "Introduction," in *Collected Speeches of Dr. William B. McClean* (China Lake, Calif.: Weapons Division, 1993), v–vi; and J. D. Gerrard-Gough and Albert Christman, *The Grand Experiment at Inyokern: Narrative of the Naval Ordnance Test Station during the Second World War and the Immediate Postwar Years* (Washington, D.C.: Naval History Division, 1978), 290–93.

25. US Navy, *Collected Speeches*, vi, footnote 3.

26. For more information on the operational dimension of the Sidewinder experience, see Marshall L. Michel III, *Clashes: Air Combat over North Vietnam, 1965–1972* (Annapolis: Naval Institute Press, 1997); or Lon Nordeen, *Air Warfare in the Missile Age* (Washington, D.C.: Smithsonian Institution Press, 1985).

27. Maj Todd Harmer, USAF, Maxwell AFB, Ala., interviewed by author, 28 February 2000.

28. Michel, 172, 181–85, 277–78; and Maj Gerald R. Volloy, "Red Flag in Perspective," *USAF Fighter Weapons Review*, Spring 1979, 2–5.

29. Barrett Tillman, *MiG Master: The Story of the F-8 Crusaders*, 2d ed. (Annapolis: Naval Institute Press, 1990), 62–71.

30. Robert Thor, "GAR-8," *Fighter Weapons Newsletter*, June 1958, 29–30.

31. Nordeen, 40–49, 74–78.

32. John Schlight, *The War in South Vietnam: The Years of the Offensive, 1965–1968* (Washington, D.C.: Office of Air Force History, 1988), 290–95; and John J. Sbrega, "Southeast Asia," in Benjamin Franklin Cooling, ed., *Case Studies in the Development of Close Air Support* (Washington, D.C.: Office of Air Force History, 1990), 469.

33. Although general-purpose bombs did not change much in principle from those used in the Korean War, progress in submunitions and cluster weapons helped with CAS. Harmer interview.

34. Delbert Corum et al., *A Tale of Two Bridges*, vol. 1, USAF Southeast Asia Monograph Series (Washington, D.C.: GPO, 1976), 34–35.

35. Nordeen, 31.

36. Peter DeLeon, *The Laser-Guided Bomb: Case History of a Development*, R-1312-1-PR (Santa Monica, Calif.: RAND, June 1974).

37. Brereton Greenhous, "The Israeli Experience," in Benjamin Cooling, ed., *Case Studies in Air Superiority* (Washington, D.C.: Office of Air Force History, 1994), 586–96; Nadav Safran, "Trial by Ordeal: The Yom Kippur War, October 1973," *International Security* 2 (Fall 1977): 130–62; Nordeen, 201–6, chaps. 8 and 9; Matthew M. Hurley, "The Bekaa Valley Air Battle, June 1982: Lessons Mislearned," *Airpower Journal* 3 (Winter 1989): 60–70; and Nick Kerr, "The Falklands Campaign," *Naval War College Review* 35 (November–December 1982): 14–21.

38. Anwar el-Sadat, *In Search of Identity: An Autobiography* (New York: Harper & Row, 1978), 261, 263.

39. Mission Study.

40. DeLeon, 6–8; and Mission Study.

41. The best single volume on the Gulf War is Thomas A. Keaney and Eliot A. Cohen's *Revolution in Warfare? Air Power in the Persian Gulf* (Annapolis: Naval Institute Press, 1995). Also very useful is James A. Winnefeld and others' *A League of Airmen: U.S. Air Power in the Gulf War*, MR-343-AF (Santa Monica, Calif.: RAND,

1994). Beyond that, the literature is huge—much of it very parochial.

42. Perhaps the most articulate arguments along those lines are those of John Warden in *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense University Press, 1988); idem, "The Enemy as a System," *Airpower Journal* 9 (Spring 1995): 40–55; and idem, "Air Theory for the Twenty-first Century," in *Challenge and Response: Anticipating US Military Security Concerns*, ed. Karl P. Magyar (Maxwell AFB, Ala.: Air University Press, August 1994), 311–32, among others.

43. Col Harry Summers, US Army, Retired, in *A Critical Analysis of the Gulf War* (New York: Dell, 1992), 95–116 and 199, is direct enough in his argument that a considerable segment of the Air Force had the conceit to think that it could win the war alone, and that the Iraqis still had some initiative until President Bush brought in the armored forces to settle the issue. Lt Col Price T. Bingham, USAF, Retired, in "Let the Air Force Fight Future Land Battles," *Armed Forces International*, August 1993, 42, argues that the "Chairman and the Joint Chiefs must concede . . . that, contrary to the US Army's AirLand Battle Doctrine, during Desert Storm, deep operations, not close operations, bore the 'ultimate burden of victory or defeat.' "

44. Edward J. Walsh, "Air Force, Navy Precision Weapons Pack Power in Economical Packages," *National Defense* 81 (May/June 1997): 34–35; and US Air Force, Headquarters Air Combat Command/DRPW, "Final Joint CAF and USN Operational Requirements Document for Joint Direct Attack Munition," 23 August 1995.

45. William S. Cohen, "Report of the Quadrennial Defense Review," May 1997, 40; Roy Braybrook, "Not-Too-Close Encounters of the Air-to-Ground Kind," *Armada International* 20 (February/March 1996): 36; Clifford Beal, "Bolt from the Blue: Stand-Off Weapon Developments," *International Defense Review*, August 1992, 757–62; idem, "Bolt from the Blue: Part 2," *International Defense Review*, December 1992, 1173–80; Heinz Hilgendorf, "Are Stand-Off Air-to-Ground Weapons a Necessity?" *Military Technology*, June 1993, 57–62; Eric H. Biass, "The Guided Dispenser: The Ultimate Attack Weapon," *Armada* 15 (August/September 1991): 6–14; John D. Morrocco, "Navy Primed for JSOW Critical Design Review," *Aviation Week & Space Technology*, 27 February 1995, 48; and US Air Force, Air Combat Command, "Air Combat Command Operational Concept for the Joint Standoff Weapon," 28 March 1994.

46. William S. Cohen, US Department of Defense, Report to Congress, Kosovo/Operation Allied Force, After-Action Report, 14 October 1999, 86–96.

47. Ibid.

48. Robert Wall, "SEAD Concerns Raised in Kosovo," *Aviation Week & Space Technology*, 26 July 1999, 75.

49. In fact, about the time of Pearl Harbor, the name *GHQ Air Force* briefly evolved to *Air Combat Command*, although it soon changed again to *Eighth Air Force*. By that time, though, most people thought that the Eighth represented just one of many to come.

50. Freedman, chap. 3.

51. Paul H. Nitze, "Is It Time to Junk our Nukes?" *Washington Quarterly* 20 (Summer 1997): 1–5; on-line, Internet, 22 June 2000; available from http://webnf1.epnet.com/fulltext.asp-ASP=KNGNGHHDFJHJODGBLDNEGLEC?resultSetId=00000000&hitNum=8&booleanTerm=Paul%20and%20Nitze&fuzzyTerm=&gotoFT=true.

Led by a Lion
The US Role in Preserving Gulf Security

Maj Brent J. Talbot, USAF
2d Lt Jeffrey J. Hicks, USAF

Editorial Abstract: This article is a wake-up reminder that the Gulf War denouement is still unfolding. Although Balkan problems and Asian tension may have temporarily eclipsed media attention on the Gulf, the hot spot fanned by Iraq and its dictator is much more than a glowing ember. We must realize that we cannot extinguish this long-term problem by sprinting but have to commit ourselves to marathon-like endurance. The Gulf scenario involves a complex interaction of economic, political, and military forces thrown into further turmoil by a long history of ethnic and religious differences. It is very much to our advantage that a miscalculation somewhere does not cause an eruption on a grand scale. Here, Major Talbot and Lieutenant Hicks explore the strategic issues and policy options.

A S THE GULF War slowly fades into the history books, it is important to realize that the Middle East remains a region scarred by conflict and tension. While the United States struggles to control the myriad problems such as guaranteeing the flow of Persian Gulf oil, deterring Iraq and Iran, and moving the Arab-Israeli peace process forward, many people wonder if the United States can "go it alone" in this critical area of the world. Not only has the Middle East threatened to overload the resources of the military, but also a growing

anti-American sentiment has subjected American troops to increasing terrorist threats in the last decade. In response to these recent trends, many individuals within the political and military arenas have pushed for a regional security arrangement that places a greater responsibility for the region's defense on the Arab countries themselves. Using the Gulf War as a catalyst, the United States has committed itself to uniting the Gulf Cooperation Council (GCC) into a defensive security regime.[1] Although drawbacks exist, such as a potential loss of US control within the region, official security-strategy documents have identified this regional cooperation as a national objective.[2]

Moreover, pressures are mounting—even within the military—to bring US forces home, as evidenced by the *Air Force Times* headline "Ryan to JCS: Give Us a Break!"[3] Currently, we have seven thousand airmen in the Middle East, and since the end of the Gulf War, between 10,000 and 28,000 US military forces have maintained constant vigilance in the Persian Gulf and surrounding region.[4] Operations in other regions of the world have come and gone, but the Gulf deployments continue on a significant scale, driving operations tempos to all-time highs for the military services. Why the continued large-scale presence when the threat has diminished? Most analysts agree that Iraq's forces, which failed so miserably against coalition forces, are less than half as capable as they were during 1991,[5] and Iran is making friendly overtures across the Gulf to its Arab neighbors and the United States. Moreover, given the efforts already put forth to strengthen the GCC (e.g., the military buildups of Kuwait and Saudi Arabia, the pending purchase of 80 F-16s by the United Arab Emirates [UAE], and the general overall improvement in the quantity and quality of weapons within the militaries of the GCC's member states), it would seem that the Joint Chiefs of Staff could answer the call of Gen Michael Ryan, Air Force chief of staff, by reducing US forces in the Middle East. This article, therefore, explores the options available to US policy makers on whether such a force reduction should take place and whether the GCC can increase its security role in the Gulf.

The article assesses US-GCC cooperation efforts to maintain the flow of oil in the Gulf, discusses obstacles to these efforts, examines the US effort to contain Iraq and Iran, addresses the ongoing Arab-Israeli peace process, and concludes with a discussion of national security strategy for the Gulf that best guides US policy for the region. It argues that at this time we cannot rely upon the GCC to increase its role in providing regional security. US forces, therefore, remain crucial to maintaining Gulf security and must be kept at current levels—at least until Saddam Hussein falls from power in Iraq. Thus, the reduced threat will allow for a decreased US presence, and, in the long term, the GCC will increase its ability to provide for its own security.

Gulf Security and US-GCC Cooperation

Whenever Gulf oil flow has been threatened, the United States has watched with utmost concern. The oil crises of 1973, 1979, and 1991 were all associated with conflict. During the Yom Kippur War of 1973, the oil states in the Gulf suspended shipments to the United States because of its exports of military hardware to Israel. The Iranian revolution of 1979 sent oil prices soaring. The subsequent Iran-Iraq War led to the so-called tanker war, which threatened Gulf shipping and in which Americans and Russians cooperated to "flag" Kuwaiti tankers in order to protect them from Iranian attack. During 1991, oil prices temporarily soared again because of the Iraqi invasion of Kuwait. Since then, US forces have been constantly present to maintain both oil flow and stability in the Gulf.

The United States has worked to improve security in two ways: (1) maintain some form of US presence and (2) bolster security assistance through weapons sales and training in the use of military hardware. Prior to the Gulf War, only Oman and Bahrain permitted any

type of US presence on their soil. Now, we have signed defense cooperation agreements (DCA) with Kuwait, the UAE, and Qatar. Saudi Arabia signed a less binding status-of-forces agreement.[6] Most of the GCC states have increased their defense postures by significantly increasing defense spending since the end of the Gulf War; in fact, four of the six are among the world's top seven countries in terms of the percentage of gross domestic product (GDP) spent on defense (table 1). Moreover, all member states have allowed some form of US presence since 1991, as detailed below.

Table 1

States Spending Greatest Share of GDP on Defense, 1999

State	GDP Percentage Spent on Defense
Eritrea	35.8
Saudi Arabia	15.7
Afghanistan	14.5
North Korea	14.3
Oman	13.6
Kuwait	12.9
Qatar	12.0

Source: International Institute for Strategic Studies, as reported in *Gulfwire*, 25 October 1999 (an online E-mail subscription weekly news service provided by the National Council on US-Arab Relations, Washington, D.C.).

Kuwait

The United States has contributed to Kuwaiti defense with sales of 40 F-18 fighters, 50 M-1 tanks, and a number of Patriot air defense missiles. The sale of Apache Long Bow helicopters has also received approval.[7] More importantly, we have pre-positioned equipment to outfit a mechanized brigade in Kuwait—including manning for a permanent brigade headquarters—and we have stationed battalion-sized units of troops there on a rotating basis. Air Force fighter units of F-16s and A-10s (sometimes F-15s) also deploy on a rotational basis. Facilities used by these soldiers and airmen undergo upgrades to improve the quality of life and to allow more aircraft to de-

ploy into the region quickly.[8] Combined training and exercises take place regularly; forces share facilities to enhance cooperation; and Kuwait picks up the tab for most in-country costs of the US presence, such as maintenance, fuel, and food. Kuwait has further enhanced its border security by digging a wide, deep ditch to stop tanks and by erecting an electric fence along the entire 215-kilometer border with Iraq, which is monitored by 19 Kuwaiti guard posts.[9] Furthermore, crises have tested the US-Kuwaiti relationship, especially during the Vigilant Warrior deployment of October 1994 in response to an Iraqi buildup of nearly one hundred thousand troops on the border. Such crises have helped to smooth out differences, and Kuwait currently views the relationship quite favorably, as evidenced by its recent decision to allow permanent stationing of the brigade headquarters.[10]

Still, the Kuwaitis have concerns. They have closely monitored cuts in the US defense budget and personnel since the end of the Gulf War, which has resulted in the ops-tempo problem noted earlier. This situation became most conspicuous to Gulf residents when US forces in the Gulf redeployed to Somalia during January 1993 to participate in the Restore Hope mission, sanctioned by the United Nations (UN) and launched the month prior. Such concerns have led them to seek backup sources of protection. Kuwait has signed DCAs with Great Britain, France, and Russia[11] and currently purchases arms from all five permanent members of the Security Council in order to ensure their support should another crisis arise.[12] In sum, the Kuwaitis' cry is "Yankee, don't go home!" Their biggest fear remains Iraq.

Saudi Arabia

Officially, the Saudis are very supportive of a US force presence since security is their number-one concern. They have continued to support Operation Southern Watch, the no-fly/no-drive zone established over southern Iraq south of the 33d parallel, which allows US aircraft to overfly Iraq to enforce the

TAJI FABRICATION PLANT, IRAQ
(ROCKET AND MISSILE COMPONENTS)

Containment of Iraq remains a vital interest of the United States in the Persian Gulf region.

UN-established zone.[13] The Saudis host the bulk of the coalition forces that enforce Southern Watch: Prince Sultan Air Base is home to approximately 60 US Air Force fighters as well as French and British warplanes, all on temporary rotational deployments, usually lasting 90 days. Still, with the exception of 1994's Operation Desert Fox, they have not allowed the launch of preplanned combat ground-attack sorties against Iraq from their soil.

To improve GCC's and its own military capabilities, Saudi Arabia houses the 10,000-man Peninsula Shield combined force based in the King Khalid Military District in the northeast sector of the country.[14] The Saudis have also recently purchased 75 F-15S fighters equipped with the latest advanced medium-range air-to-air missiles (AMRAAM),[15] as well as 60 Tornado fighters from Europe. A major purchase of US F-16s may occur in the future as the Saudis replace their fleet of F-5s.[16] Early buyers of the airborne warning and control system aircraft, they now lead GCC efforts toward building an integrated ground-based radar system for air defense, currently under construction. They are also driving GCC's purchase of a secure telecommunications system and have plans for a combined command, control, communications, and intelligence center.[17]

The Southern Gulf

Iran, not Iraq, poses the greatest threat to the Southern Gulf states. A dispute over ownership of the Tunbs and Abu Musa islands remains the primary source of contention between

the UAE and Iran. As recently as October 1999, the UAE ambassador to the UN called Iran's military presence on the islands "a threat to the UAE."[18] To build its defenses, the UAE plans to buy the latest Block-60 version of the F-16 aircraft, including the latest AMRAAMs and high-speed antiradiation missiles.[19] However, like Saudi Arabia, the UAE has chosen not to rely on US fighter technology alone and is buying an additional 33 Mirage 2000-9s from France. It is also upgrading the 30 Mirages already in its inventory to match the capabilities of the 2000-9s.[20] Russia has also benefited from the UAE's arming efforts with sales of portable surface-to-air missiles (SAM), including the SA-7, -14, and -16; an SA-12 unit; and the lease of four IL-76 transport aircraft.[21]

Qatar has agreed to host pre-positioned equipment for an Army brigade now 80 percent in-place,[22] and in 1996 it hosted an air expeditionary force consisting of 30 fighters and four tankers. Air Force pre-positioning is also likely,[23] given the ongoing construction of what may be the premier air base in the Gulf at Al-Udeid. One analyst suggested that the Qatari philosophy behind construction was "build it and they will come."[24] In other words, one obtains the best defense by providing the best facilities for US and coalition forces. As for weapons buys, the fact that the Qataris purchase 70 percent of their military hardware from France creates difficulties in terms of integrating systems in the GCC's defense structure. Purchases have included 12 Mirage 2000-5 fighters.[25] Moreover, Bahrain has signed a deal for 10–12 F-16 fighters, which, like the UAE's, will have AMRAAMs.[26] Bahrain allows the US Air Force to pre-position equipment to support eleven hundred personnel as well as flight-line maintenance and medical-evacuation supplies.[27] Officially, both Bahrain and Qatar remain very supportive of the US presence in the Gulf.

Less able to afford military technology than its neighbors, Oman still ardently supports the GCC's Peninsula Shield combined military force and provides soldiers to militaries of other Gulf states, including Kuwait,

the UAE, and Qatar, who face manpower shortages.[28] Oman, perhaps the strongest supporter of the US presence in the Gulf, signed its access agreement with the United States in 1981, an unpopular time to do so. It hosts three Air Force pre-positioning sites with support equipment for 26,000 personnel as well as required equipment and fuel to maintain three air bases.[29] Moreover, Oman's neutral stance during the Iran-Iraq War has allowed it to keep positive relations with Iran, and it is the only Gulf State invited to observe Iranian military exercises. The fact that Oman also functions as mediator in the island dispute between the UAE and Iran[30] could make it a useful intermediary for US-Iranian and GCC-Iranian relations.

As noted above, the Gulf states tend to buy a variety of weapons from a variety of sources, symbolizing more of an effort to buy alliances than build a technologically competent force. Anthony Cordesman refers to this phenomenon as *technological turbulence*.[31] Without a focus on manpower training, interoperability, and force sustainability, the Gulf efforts to acquire high-technology weapons may do more harm than good for the building of a Gulf coalition. Such massive arms buildups without a focus on the mission leaves sustainability in question. This remains a problem, despite recent announcements that the GCC is "striving for an unprecedented level of integration between their militaries"[32] and despite the Saudis' efforts, described earlier, to integrate air defense, communications, and command and control.

Still, Secretary of Defense William Cohen has encouraged GCC's efforts by recently proposing a "cooperative defense initiative," which envisions sharing early warning information, promoting theater missile defense, and improving deterrence through consequence management. The latter entails the sharing of passive systems such as protective clothing and vaccines against biological and chemical threats and training the GCC states in dealing with humanitarian catastrophes resulting from nuclear, biological, and chemical (NBC) attacks.[33] Such efforts move the
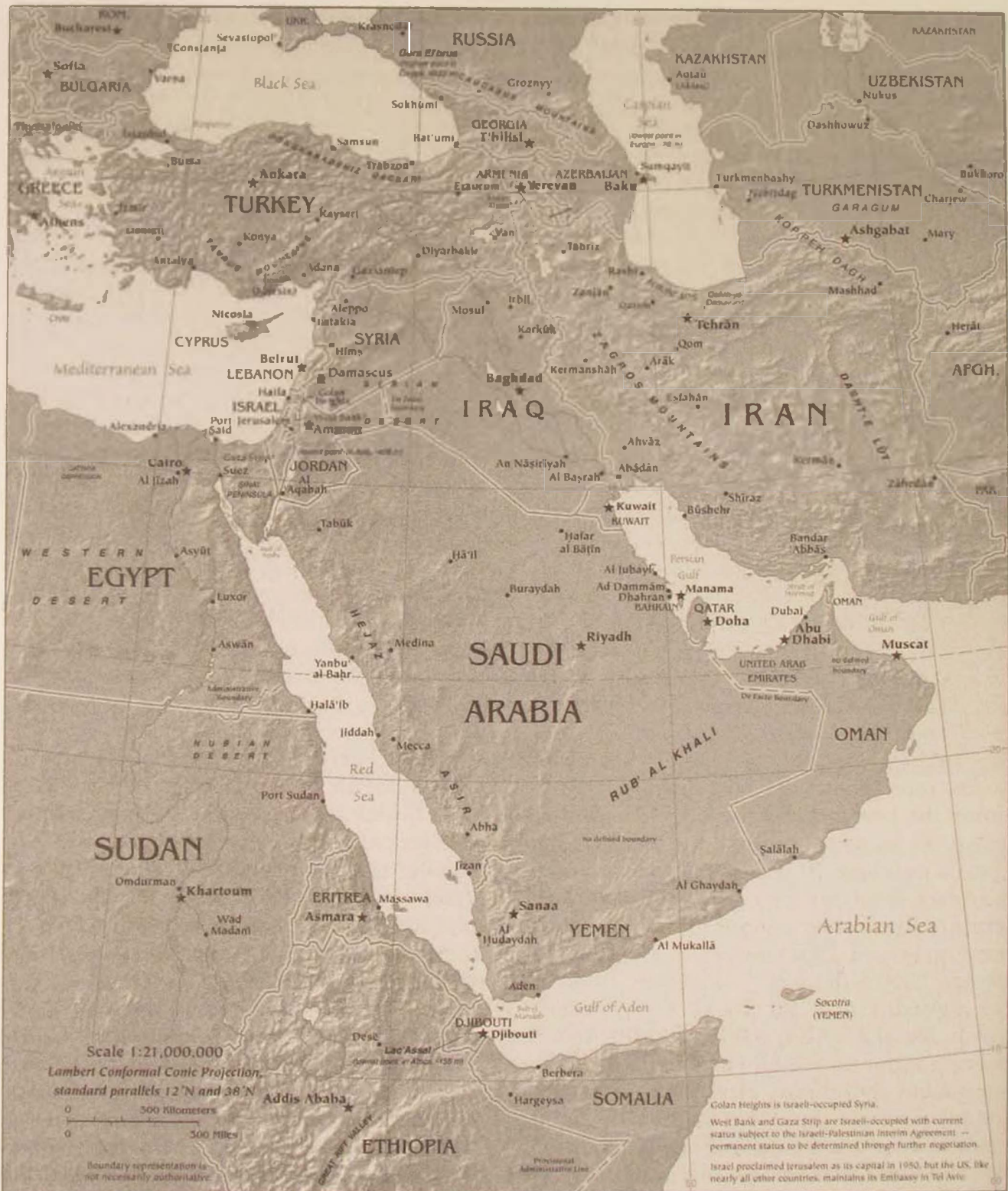
GCC toward greater military cooperation and improve the likelihood of self-reliance in the future, but US policy makers must be careful before deciding to move US forces over the horizon. Indeed, Secretary Cohen's recent proposal is likely to increase rather than lessen the involvement of the United States in the region. Most experts agree that we cannot make the GCC force into something it is not and that Saudi efforts such as the integrated
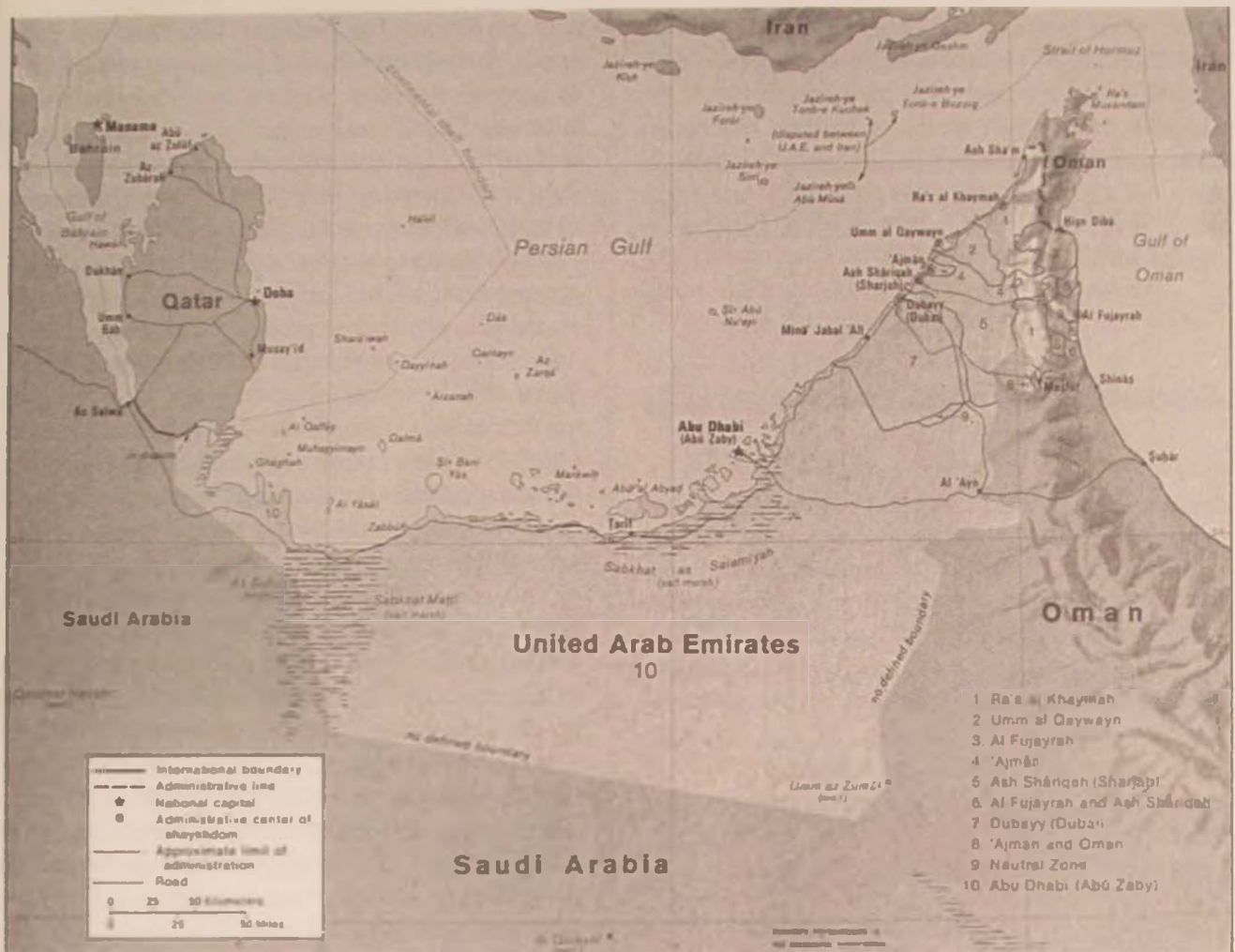
radar system are in their infant stages, requiring a more robust plan for deployment. In other words, there is no "budding North Atlantic Treaty Organization (NATO)" in the near future of the GCC, despite some reports to the contrary.[54]

Obviously, then, the Gulf states are buying the forces to bolster security and have significantly improved their inventories since the end of the Gulf War, especially Saudi Arabia, Kuwait, and the UAE (table 2). The other countries' efforts are more modest, but one should emphasize their gains in order to keep policy makers working toward continued US involvement in the region, especially in light of technological turbulence and additional obstacles to GCC cooperation, mentioned below. Dr. John Duke Anthony of the National Council on US-Arab Relations stresses

four positives. First, the GCC, a coalition-in-being since 1984, has assembled a 10,000-man Peninsula Shield force and is improving defense cooperation with shared air defense and communications networks. Second, the Gulf states have provided more basing support (fuel, logistics, etc.) to the United States than other allies in other regions of the world where America has deployed troops. Third, GCC states pay cash for weapons purchases and paid for much of the US operations costs during the Gulf War. Other areas of the world have more typically relied upon outside financial assistance. Fourth, no Gulf state currently demands the removal of US troops from its soil. Moreover, Dr. Anthony recommends that we should be careful to avoid giving the Gulf Arabs the impression that we are not committed to staying in the region as

long as necessary to provide security.[35] Indeed, much of their concern stems from past inconsistencies and recent reports that the United States will reduce forces. Secretary Cohen visited the Gulf in October 1999 to assure GCC members that "we will keep the same level of forces in the region for the indefinite future."[36]

Table 2

Comparison of Forces: Iran, Iraq, and GCC

	Iran	Iraq	GCC
Active Military Forces	545,600	429,000	308,600
Active Main Battle Tanks	1,390	1,900	1,447
Total Combat Aircraft	307	353	689

Source: Anthony Cordesman, "The Military Balance in the Middle East—Gulf Overview: Part VIII," CSIS, 29 December 1998, 5, 11, 34.

Obstacles to US-GCC Cooperation

I and my brothers against my cousin; I and my cousins against the stranger.

—Arab proverb

Despite bilateral cooperation, agreements with the United States, and GCC's multilateral cooperative efforts, mentioned above, the Gulf Arabs remain fragmented for a variety of reasons that we must address in order to evaluate security prospects for the Gulf. Moreover, military cooperation efforts with other Arab countries beyond the Gulf have failed to materialize.

Outside observers would likely view an organization such as the GCC as a Pan-Arab movement, but Arab nationalism has actually died a quiet death within the Gulf, and national sovereignty has become the focus of the Middle Eastern states.[37] There were at least three contending perceptions with regard to joining the GCC, according to UAE professor Abdul Khaleq Abdulla, and only one envisioned a military alliance. To illustrate, Kuwait saw the GCC as a potential Arab common market with economic benefits, whereas Saudi Arabia had plans of preserving the political status quo on the Arabian Peninsula and ensuring itself of the dominant role. Oman was keen to create a Gulf version of NATO and stressed the need to coordinate strategy with the United States. The smaller states simply felt that the GCC represented "added insurance" and that they would gain from the benefits of economic and military cooperation. With these differences in mind, the GCC role remains unclear, and it has even "done everything conceivable, in both word and deed, to avoid being perceived as a military alliance against any nation."[38]

Moreover, the tribal or family aspect of the Gulf monarchies results in many ongoing rivalries that drive a wedge between closer GCC relations, and individual state policies often work at cross-purposes with one another. Oman, for example, believes that the Saudis readily oppose most of the ideas and initiatives of the other states in an effort to dominate the GCC. The Saudis' de facto "veto" of Sultan Qaboos's recommendation in 1991 to increase the size of the Peninsula Shield's combined force from 10,000 to one hundred thousand troops derived from a political rivalry with Oman.[39] A high-ranking Omani official also feels that less trust exists among GCC members since the Gulf War, claiming that many people in his country think the Saudi royal family is too powerful and that the power division between Crown Prince Abdullah (who commands the regular army) and Prince Sultan (who commands the National Guard) will lead to a power rivalry after King Fahd's passing—one that would impair stability within the GCC.[40]

Furthermore, Qatar has angered the Saudis and the Kuwaitis by reestablishing diplomatic relations with Iraq. Qatar also initiated a natural-gas deal with the Israelis and signed a series of agreements with Iran against GCC's wishes at the time. In turn, the surrounding states continued to support the deposed emir of Qatar, Sheik Khalifa, by offering a "head of

state" welcome,[41] leading to Qatar's pullout from spring 1996 exercises conducted by the Peninsula Shield force.[42] Moreover, border disputes exist between Qatar-Bahrain and Qatar-Saudi Arabia, which led to a bloody encounter between the latter two in 1992.

Bahrain faces internal disputes due to its Shia majority in the Sunni-controlled state. The Shia may not serve in the military or police force, requiring Bahrain to rely on recruits from other GCC states to fill its ranks. In the past, Iranian groups have also been found in Bahrain making contact with the Bahraini Shia and stirring up trouble against the government.[43] More recently, however, the Iranians are having less success with the Arab-Shia of Bahrain as they face their own legitimacy crisis at home.[44]

The regional cooperation that does exist stems from the belief that the Gulf states are sovereign and should not be subject to attack or threats from beyond the peninsula. Such threats come not only from Iraq and Iran but also from the United States (or such is the perception), albeit not in the traditional sense. Many Arabs believe that Western culture represents an attack on their own religion and culture, perceiving it as a threat as dangerous as any military invasion they may face. Some Gulf states, in particular Saudi Arabia, believe that a stronger regional security arrangement will result in a smaller US presence within the region, helping to establish their own sovereignty while eliminating the influence of American culture. Although such governments as Saudi Arabia's appreciate the security and business that the American presence brings to the region, they must balance their own wishes with those of the people in the long term. Many Saudi Arabian citizens despise the American presence, an occupation of sorts in their eyes. These citizens, if they cannot find recourse within their own government, often turn to fundamentalist movements that readily take up the cause of purging the region of Western influence, as evidenced by the Khobar towers bombing of 1996 in Saudi Arabia. The governments of these Gulf states, although not necessarily

holding to the fundamentalists' views, recognize that they must appease such religious perceptions if they wish to maintain power.

Many Arabs believe that Western culture represents an attack on their own religion and culture, perceiving it as a threat as dangerous as any military invasion they may face.

They hope that an improved regional-security arrangement dominated by Arab nations will increase their own internal security while quieting the fundamentalists' calls for an end to American "imperialism."

The Gulf states thus find themselves in an interesting and, in some respects, embarrassing dilemma. As proud Muslims, many find it disgraceful that they have become so reliant upon Western powers. However, despite strong sentiments and rhetoric, many Arabs believe that the US presence is a necessary evil until they can stand by themselves within an independent security regime. Indeed, as mentioned earlier, no government has called for a reduction of US forces, and doubts remain as to whether the GCC can completely provide its own security anytime in the near future.

Immediately following the Gulf War, the GCC states realized that one of their greatest obstacles to security was a lack of military manpower, primarily due to small populations in most GCC states. The problem also stemmed from the unwillingness of the authoritarian regimes to place too much power in the hands of the military by conscripting a large force. In response, the GCC states signed an agreement with Egypt and Syria to provide needed manpower for a "Gulf security regime" (also known as the "Damascus Declaration" or "six plus two" agreement) in order to prevent a repeat of the Gulf War. The GCC states hoped that Egyptian and Syrian forces would be on hand to deter or stop future Iraqi attacks until US or other Western enforcements arrived to push back any poten-

tial invader. However, not long after the end of the Gulf War, the Saudis kindly asked the Egyptian and Syrian forces, left behind in Saudi Arabia, to depart, out of fear of Syrian-Egyptian intentions over the long term. Most analysts now believe that the Damascus Declaration is a dead issue, and one could say that the governments of the Gulf states simply trusted Washington more than their Egyptian and Syrian cousins.[45] Thus, US policy makers should not rely on those states as backup sources of manpower for the GCC.

In sum, domestic tensions have risen throughout the region, forcing the GCC states to be more protective of their national sovereignty than ever before.[46] Paul Noble provides several reasons for this situation. First, socioeconomic tensions have arisen because of high population growth rates, which, coupled with falling oil prices, have lowered GDPs among the Gulf states. Second, and a new source of tension, disgruntled populations protest the domineering behavior and insensitivity of the United States and Western powers whose military forces remain in the region. Third, and of greatest concern, the frustrations of continuing authoritarian rule and the turn to Islam or fundamentalism as a more legitimate source of rule have produced sociocultural and political tensions.[47] Many states have created parliaments in an attempt to become more moderate and in touch with such cultural tensions, but some analysts think these reforms take place too slowly. In the future, the decentralizing effects of the information revolution could undermine the Gulf's authoritarian regimes. The authoritarian governments will be less able to make "back room deals" and cover up their mistakes than in the past, and, in any case, these effects will force them to become more accountable to their populations.[48] With so many potential problems on the governments' agendas, at least one of the southern Gulf states may reach a breaking point—something that US analysts of the region need to watch out for. Moreover, the demise of the Damascus Declaration leaves the GCC

states unable to defend themselves and makes necessary a US military presence in the region.

Dual Containment Policy: Iraq and Iran

One must discuss US policy with regard to Iraq and Iran in order to fully develop a Gulf regional security policy. The term *dual containment,* coined by the Clinton administration for domestic political considerations, actually refers to two quite different policies. US policy toward Iraq goes far beyond containment and has included frequent military action, funding of opposition groups, and protection of Kurds and Shiites within Iraqi borders. In general, nothing short of the replacement of the current regime will result in a new US policy toward Iraq. In other words, the US seeks new leadership there but has made no commitment to actually overthrow the government. The policy toward Iran is much less obtrusive, simply limited to preventing it from dominating its neighbors, spreading terrorism and subversion, and limiting imports to control the proliferation of weapons of mass destruction (WMD). The focus is more on changing Iranian foreign policy, not its government.[49]

Iraq

US efforts to contain Iraq have been successful in that Saddam has not attacked his neighbors, and his forces have been reduced by half since 1991. Its WMD program was slowed significantly by the United Nations Special Commission's inspections. Still, many people have criticized US policy because Saddam remains in power and because many of the administration's decisions have hurt the coalition built to defeat Iraq, especially during 1997–98, in which the intrusive inspection regime, so crucial to ensuring denial of WMD, ended.[50]

Since Desert Fox (December 1998), military strikes have occurred regularly in Iraq. Michael Eisenstadt questions whether a policy of "occasional military strikes" is politically sustainable, given that the Gulf Arabs as well

as France and Russia have questioned the bombing and have withheld support in the past.[51] Nevertheless, Pentagon officials approve of the altered rules of engagement that have evolved since Desert Fox and allow allied forces to preemptively strike any part of the Iraqi air defense system anytime provocation occurs. This "low-level war of attrition" continues as long as Iraq challenges the no-fly-zone operations and has resulted in the destruction of a quarter of the Iraqi air defense system.[52] Furthermore, some analysts believe that the pressure of continued air strikes throughout 1999 has weakened Saddam's hold on power. Iraqi acts that may indicate an element of desperation include calling for the overthrow of governments in neighboring countries (Egypt, Jordan, Saudi Arabia, and Kuwait); storming out of a meeting of the Arab League after that body insisted on Iraq's compliance with UN resolutions; threatening attacks on Turkey, Kuwait, and Saudi Arabia; and denying ammunition supplies to Iraq's regular army units to discourage rebellion. Moreover, in March 1999, reports indicated that Saddam had executed 24 army officers, including the general who commanded Baghdad's air defense system.[53]

Overall, events since Desert Fox seem to have isolated Saddam and perhaps weakened his hold on power. In fact, while addressing an audience at the Virginia Military Institute in September 1999, Gen Anthony Zinni, commander of US Central Command (CENT-COM), made a bold prediction that Saddam would fall from power within the next year.[54] With that in mind, policy makers must address what might happen in a post-Saddam Gulf. The administration has not thought carefully through this contingency other than to plan to withdraw the majority of military forces based in the Gulf to over the horizon, once the Iraqi threat vanishes. We must also have a strategy to keep the state of Iraq from disintegrating should Saddam suddenly fall.[55]

Iran

Policy analysts conduct an ongoing debate regarding Iran, some calling for continued sanctions and criticizing the US policy of thawing relations.[56] Others see Iranian president Mohammad Khatami as a moderate, feeling that the United States should end sanctions and make every effort to establish an open dialogue—even diplomatic relations—with his regime.[57] Somewhere in between lies the most likely middle ground.

During 1995–96, US policy focused on isolating Iran. President Bill Clinton cancelled a Conoco-Iranian deal to develop two Gulf oil fields, and the congressional Iran-Libya Sanctions Act (ILSA) imposed sanctions on foreign firms investing more than $40 million in Iran's oil and gas industry. Since 1997, US policy has moderated. ILSA sanctions were not applied to the French firm Total, which took the place of Conoco in developing an Iranian oil field, although the US government continues to oppose investment in the oil sector. Moreover, both President Clinton and Secretary of State Madeleine Albright have indicated a willingness to improve relations with Iran.[58]

Indeed, Iran eradicated its poppy crop last year, allowing the United States to remove it from the list of major drug producers, and athletic and academic exchanges have begun between the United States and Iran. The Treasury Department also approved the sale of American grain.[59] But sanctions remain in place to ban dual-use technologies that could be used to produce WMD, and Iran remains on the list of state supporters of terrorism. The sanctions will likely remain in place until Iran stops supporting and encouraging terrorist groups that interfere with the Arab-Israeli peace process.[60]

Iran's military, like Iraq's, has been hampered by many problems. Modernization efforts have not kept up with the effects of time and wear and tear on the equipment. For example, during 1989–91, Iran received 24 MiG-29 fighters and 12 Su-24 deep-strike aircraft, as well as SA-5 and SA-6 SAMs.[61] But agreements for further deliveries after the end of the cold war were curtailed due to lack of money. Patrick Clawson reports that from 1989 to 1996, Iran sought one hundred to two

hundred fighter aircraft but received only 57. Foreign-exchange purchases for weapons fell from $2.5 billion in 1991 to less than $1 billion in 1997.[62] Moreover, Iran signed the Chemical Weapons Convention in January 1998, which obligates it to declare its chemical weapons inventories and destroy them within 10 years.[63] Still, Iran's intentions, when it comes to the Chemical Weapons Convention as well as the Nonproliferation Treaty, remain unknown due to the power struggle between moderates and conservatives within the government. For example, Iran's Revolutionary Guard Corps commander, Yaha Rahim Safavi, who is in charge of Iran's NBC weapons programs, announced his opposition to arms control commitments during a closed meeting with his officers.[64] Moreover, the Central Intelligence Agency recently announced that Iran may already have a nuclear capability.[65] Iran has also recently tested the intermediate-range missile Shahab-3, which has the capability of reaching across the Gulf to all countries of the GCC and Israel.[66]

Lack of money has also affected the Iranian population. Clawson reports that living standards are at half the prerevolution level. Over eight hundred thousand young men join the labor force each year although government policies create only 350,000 new jobs.[67] Growing domestic demands will also curtail oil sales—official forecasts put Iranian consumption equal with production in 15–25 years.[68] This will further cripple the economy unless Iran can develop means of diversification that provide other exports to replace oil. These conditions help to explain the university protests that occurred throughout Iran during the summer of 1999. Students acted to defend Khatami's economic reform and modernization efforts, which have clashed with the thinking of conservative clerics led by Supreme Guide Ayatollah Ali Khamanei, who remains the ultimate ruler of Iran.

Many people argue that the United States is not doing everything it could to prevent Iraq and Iran from rebuilding their military arsenals, including ballistic missile technology. Still, even officials responsible for overseeing the numerous arms control regimes recognize that they are often just an irritant to those states and individuals committed to exporting and importing weapon technology. As Michael Barnett points out, the Middle East has been proficient in circumventing arms control regimes and inspection agencies, some of the ways in which confidence can be restored to a region.[69] Although some scholars claim that the spread of missile technology raises the costs of war and thus provides a deterrent capacity, the extent to which this technology enables and encourages a potential first strike destabilizes the entire region. Indeed, many people wonder if Iran and Iraq will play by the rules that guide the decisions of other states in a region where insecurity guides the actions of most, if not all, of the players. Specifically, they question if one can apply the rational-actor assumption to these and other proliferating nations. Other people argue that the acquisition of such weapons may make actors rational, but the general consensus is that Iran and Iraq (especially under Saddam) are less predictable than other states with which the United States deals.[70]

In sum, dual containment remains the correct short-term policy in the northern Gulf region. Until Saddam is removed from power, we must maintain pressure on the Iraqi regime. In Iran, the struggle for leadership leaves that state in uncertain hands until a victor emerges. Until then, we must demonstrate our lack of approval of WMD proliferation efforts while at the same time letting Khatami know that we would like to work toward amiable relations in the future. We should also support improved Iranian ties with the GCC. Moreover, as discussed below, US-Iranian relations could improve by moving Israel and Syria toward a comprehensive peace agreement.

Israel, the Peace Process, and the Gulf

The history of the Middle East has shown anti-Israeli sentiment as one of the strongest

unifying causes for the Arab and Muslim states. The lack of progress in the Arab-Israeli peace process thus contributes to frustrations throughout the Middle East, provides an additional reason to criticize US efforts in the region, and encourages the Israeli lobby to block US military assistance to the Gulf Arabs.[71] The Arab states believe that, as a superpower, the United States can force a peace settlement and could do so if its policies did not always favor Israel.[72] Syria, Israel's primary adversary, boasts armed forces totaling more than four hundred thousand men, with a like number in reserve, as well as an arsenal including more than forty-six hundred modern tanks and some six hundred combat aircraft—greater than those of any other regional state or the combined assets of Britain, France, and Italy.[73] Syria also has close ties to Iran, another Israeli adversary. Iranian support to the Hizbollah in Lebanon, which routinely carries out attacks against the Israeli military, would be severely curtailed by a Syrian-Israeli peace treaty. In turn, Iran's justification for opposing Israel would lose credibility.

Thus, making peace with Syria is important because it would reduce tensions in the region and likely lead to peace with Lebanon and Palestine, the only other hurdles remaining to a multilateral settlement involving all of the surrounding Arab states. Such a peace is so crucial to US security concerns that Brent Scowcroft, former national security advisor to President George Bush, suggests it may be in our national interest to put US troops on the Golan Heights to ensure a negotiated peace settlement between Israel and Syria.[74] Israeli-Syrian peace would also placate Egyptian reservations about being the only major Middle Eastern military power to have signed a peace deal with Israel. Moreover, of direct concern to the GCC region, Israeli prime minister Ehud Barak believes that a peace settlement will "open an avenue [of Arab-Israeli cooperation] to the entire Arabian Peninsula."[75] Indeed, a security arrangement that actually improves the stability of the entire region, not to mention the individual GCC states, would be an important step in

Persian Gulf commitments require a US presence.

bringing comprehensive peace to the Middle East. Thus, US policy must address the issue of Israel and the peace process in order to improve the prospects for security in the GCC region.

Preserving Gulf and Regional Security: US Policy Recommendations

It is better to be part of a herd led by a lion than to be the leader of a flock of sheep.

—Arab proverb

Of the many options for US grand strategy after the cold war, Robert J. Art points to *selective engagement* as an emerging favorite among military analysts. By definition, selective engagement means "steer[ing] the middle course between an isolationist, unilateralist course, on the one hand, and a world policeman, highly interventionist role, on the other. . . . It strikes a balance between doing too much and too little" to support our allies.[76] Selective engagement envisions leadership over effective alliances "because standing alliances permit more rapid and more effective action than assembling ad hoc coalitions," and alliances can provide institutional forums to manage political-military relations.[77] NATO has proven to be such an institution in Europe, where it effectively stood the cold war test of time and more recently was able to bring an end to conflict in Bosnia after the UN had failed to do so.

The question thus arises, Can the states of the GCC and the United States build such an alliance? Even though we have pointed out

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many reasons why the GCC does not make up such an alliance at present, in the longer term, it has the potential of doing so. When one considers why these weak, secondary states have agreed to become more rather than less entangled with the United States since the Gulf War, one sees that the answer lies in the powerful incentives to create a legitimate political order. A cooperative order might emerge in the Gulf around a bargain: the states cooperate to enhance Gulf security, and, in turn, the United States provides a security guarantee. At the same time—and this is a key part of the agreement—the United States *limits its exercise of power in the region.* Many concerns and criticisms coming from the Gulf states' populations are based upon the fear of the United States overstaying its welcome, while the governments are generally concerned we might abandon them. Being *led by a lion* (the United States) is better than *following the sheep* (reliance upon the GCC) in the eyes of the Gulf Arabs. Strategic restraint on the part of the United States, coupled with security guarantees and efforts to promote intertheater cooperation, addresses Arab concerns and allows the GCC to evolve toward a regional security organization.[78]

Moreover, in the Middle East, Gulf leaders trust the United States more than they trust other Arab states such as Egypt and Syria—or even each other, for that matter. This is particularly true of the small GCC states with regard to Saudi Arabia; thus, engagement in this region of the world is crucial to keeping them united against a potential aggressor.[79] It also follows that a selective-engagement strategy fulfills the leading US national interests in the Middle East: securing the flow of Persian Gulf oil by sustaining the GCC states, curbing potential Iraqi and Iranian ambitions in the region, and enhancing the Arab-Israeli peace process.

GCC

In order to enact a selective-engagement policy in the GCC region, the United States must continue to build on its bilateral ties with each of the Gulf states and work toward helping them reach a more formalized multilateral security arrangement. But it must do so slowly and deliberately, allowing the Gulf states to develop their own security structure rather than forcing a Western mold upon them. America cannot prescribe this process. Gulf leaders realize the need for cooperation, and, in their own way, they see themselves as brothers—one Arab nation facing common threats and sharing common interests. The Gulf states will come up with their own security initiatives over time, and we can provide the leadership, guidance, and prodding they need, especially in the not-too-distant future, when most of the current leaders will be replaced by a younger and more technically savvy generation with a greater vision and understanding of this need.[80] Most importantly, we must ensure them of our commitment to help them. One can almost guarantee that the future of the Middle East will be fraught with crises, and the Gulf states need to know that the United States will support them militarily. A reaffirmation of the Carter Doctrine by the current president and his replacement after this year's elections would be appropriate.[81]

Furthermore, supplying the Gulf with US weapons technology and security assistance improves security and creates a dependent relationship, which in turn creates a continuing need for US presence and assistance. Even though Ayatollah Ruhollah Khomeini had US technology after taking over Iran, the

withdrawal of US assistance rendered the technology either useless or greatly reduced in terms of efficiency. The same would apply to technology left to a fundamentalist regime on the Arabian Peninsula should one ever come to power. Interoperability could also be improved if the United States could convince the GCC states to buy mostly American or at least to procure compatible weapons systems across the coalition. One can achieve this only by building trust, maintaining a consistent policy, and reassuring them that American might will help them when the chips are down. They buy European—even Russian and Chinese—weapons in an effort to buy allies and assurances rather than to improve their military force structure. If US policy assured them that US support was unwavering, they would feel more secure and would more likely work toward interoperability and commonality of forces to improve the GCC alliance.

Moreover, American interaction with Gulf regimes could encourage (and perhaps has encouraged) the evolution of more democratic-like institutions in order to give the populations a greater voice in government and to help alleviate sociopolitical pressures that bolster Islamic fundamentalist movements. Such encouragement needs to come about through careful, diplomatic, constructive criticism and should not in any way arouse human-rights condemnations of the monarchial regimes. Gulf governments understand the necessity of controlling the forces calling for reform and are working to placate them in ways acceptable to their culture. Encouragement from US policy makers is intended only to get the process past sticking points and may even win support among those who desire reform.

Iraq and Iran

Any regional security vision must address Iraq and Iran. US policy toward Iraq should maintain the UN-imposed no-fly zones and sanctions as long as Saddam remains in power. Departure from this policy would only embolden Saddam to rebuild his military infrastructure and threaten the Gulf again, cost

Airpower demonstrations are part of US operations in the Persian Gulf.

the United States a great deal of credibility among its Gulf allies, and endanger the flow of oil. US forces in the Gulf should remain at present levels unless/until Saddam leaves the scene. Still, overtures should continue to the opposition groups, and the United States should increase efforts at letting the Iraqi people know that its conflict is with Saddam and not them. Iraq will be brought back into the fold of nations as soon as Saddam is removed from power. We should prepare plans to assist Iraq in its rebuilding efforts in case Saddam does make a sudden departure.

As for Iran, the United States should encourage the Saudi-led overtures toward cooperation across the Gulf, and, over time, it should also pursue a normalization of relations. We cannot rush this, due to the ongoing power struggle between Khatami and the more conservative clerics. Getting too friendly with the West too soon might weaken Khatami's hand and result in his downfall, because the pro-cleric forces are still very anti-Western.[82] More than likely, the majority of the Iranian people will support Khatami's reforms, and we should support his efforts through back-channel negotiations until he emerges with greater control of the government. Should he do so, the United States could pursue a normalization of relations, including participation in security arrangements in the Gulf.

Arab-Israeli Peace Process

US involvement in the Arab-Israeli peace process can also follow the doctrine of selective

engagement. The United States should continue to encourage progress in the talks and be prepared to provide security guarantees and aid to the states that have yet to reach settlements with Israel (namely, Syria, Lebanon, and the Palestinian Authority). At the same time, the special relationship between the United States and Israel should continue, particularly the military cooperation that supplies high-technology weapons. But the United States must do more to treat the Arabs fairly and apply pressure when necessary to move negotiations forward. This is much easier said than done, given the domestic political considerations within the United States; still, such efforts could go a long way toward achieving real peace with the Levant Arabs and signal the Gulf Arabs that the United States can be a fair and equitable broker. This, in turn, would improve the prospects of achieving a lasting security arrangement in the Gulf.

Conclusion

Policy makers often work within a vacuum of sorts, for all too often they become so engrossed in their own small piece of the puzzle that they lose sight of the big picture. The overarching goals of the United States within the Gulf and greater Middle East are simple to spell out: (1) protect the flow of oil and provide security to the Gulf, (2) contain Iraq and Iran, and (3) advance the peace process. In short, the United States seeks to preserve peace and stability and bring prosperity to the Middle East. Although the goals may be simple to define, the solutions are exponentially more complex. The Middle East, like the entire world, is a complicated, interdependent region. An action in one state aimed at addressing a problem will inevitably raise several new problems in several new states. That may appear to be an intuitive part of international relations, but it is a fact that is all too often dismissed when policy is enacted. The United States cannot afford to make such a mistake in this situation. The Middle East is a volatile region, where centuries of conflict, mixed with NBC weapons, promise a difficult and insecure future. Richard Haas's words serve as most appropriate guides to future policy: A "sturdy vision and consistent follow-up" is essential, and one must remember that "international institutions and norms take years to effect."[83] This is especially true in the Middle East, which is so culturally different from the West and where the term *institution* takes on an altered meaning. Such is the case with the GCC institution. It will take patience and the will to resist ad hoc, reactionary policies sometimes driven by domestic policy to keep US leadership and assistance to the region on track. There is no simple solution, and there is little room for error. The United States may get only one chance—it should be one that will work.   □

Notes

1. The GCC is made up of the six Gulf states of Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates (UAE), and Oman.

2. For an excellent overview of US strategic interests in the Middle East, as well as a discussion of US plans for increasing the stability in the region, see Office of the Assistant Secretary of Defense, *United States Security Strategy for the Middle East* (Washington, D.C.: Department of Defense, Office of International Security Affairs, May 1995); and Robert J. Lieber, "Domestic Politics and Foreign Policy: Making Sense of America's Role in the Middle East Peace Process," *World Affairs* 161 (Summer 1998): 3–9.

3. The headline refers to Gen Michael Ryan, the Air Force's chief of staff, and his comments to the Joint Chiefs of Staff on the need to slow the operations tempo driven by the large number of overseas deployments, including those in Turkey (Northern Watch) and Saudi Arabia/Kuwait (Southern Watch), which in-

volve nearly seven thousand airmen. See William Matthews and Bruce Rolfsen, "Ryan to JCS: Give Us a Break!" *Air Force Times*, 12 July 1999, 8.

4. Statistics from Jay E. Hines, US Central Command (CENTCOM) historian, reprinted in John Duke Anthony and Jean R. AbiNader, eds., "7th Annual U.S. Mideast Policymakers Conference Highlights" (Washington, D.C.: National Council on US-Arab Relations, 13–14 September 1998), 41.

5. As reported by the CENTCOM commander, Iraq has half the number of divisions and half the number of aircraft that it possessed at the beginning of the Gulf War. See Gen Anthony C. Zinni, keynote address, in Anthony and AbiNader, 39.

6. DCAs and status-of-forces agreements are authorized by the president as commander in chief and regulate the rights, privileges, and responsibilities of US military personnel in foreign countries. The more comprehensive DCAs also regulate access or basing

rights, pre-positioning of military equipment, and cost sharing. The Saudi and US governments disagree on whether the DCA between them remains in effect since the end of Operation Desert Storm, based on their belief that the end of the Gulf War terminated the agreement. Moreover, the UAE no longer recognizes its DCA. We still treat both as if they were in force. The UAE disputes jurisdiction over US troops and wants court jurisdiction in criminal cases. Qatar and Bahrain have also expressed desires to renegotiate their DCAs. All are 10-year agreements, and most will expire in 2001. At present, only Kuwait and Oman are content with the negotiated DCAs. Lt Col Steve Farrow, CENTCOM J-5, interviewed by Maj Brent J. Talbot, 1 September 1999.

7. Paladin artillery units as well as tube launched, optically tracked, wire guided (TOW) and Sidewinder missiles are also being sold to Kuwait. Commander John Sarao, CENTCOM J-4/7, interviewed by Maj Brent J. Talbot, 1 September 1999.

8. Kuwait and the United States will share the $193 million construction costs to upgrade Al-Jaber Air Base and Camp Doha. The air base will be expanded to accommodate large transport aircraft. Camp Doha will become permanent headquarters for Operation Desert Spring, a brigade-command unit, and battalions will continue to deploy on a rotational basis to conduct exercises with the Kuwaitis and provide deterrence against Iraq. See Jim Garamone, "Kuwait OKs Long-Term U.S. Presence, Base Upgrades," *Defenselink*, 25 October 1999; on-line, Internet, 21 November 1999, available from www.defenselink.mil/news/Oct1999/n10251999_9910253.html.

9. Shafeeq Ghabra, "Kuwait and the United States: The Reluctant Ally and U.S. Policy toward the Gulf," in David W. Lesch, ed., *The Middle East and the United States: A Historical and Political Reassessment*, 2d ed. (Boulder, Colo.: Westview Press, 1999), 304–5.

10. Shafeeq Ghabra, director of the Kuwait Information Office, also emphasized the excellent US-Kuwaiti relationship. Interviewed by Maj Brent J. Talbot, Washington, D.C., 28 July 1999.

11. Ghabra, "Kuwait and the United States," 305–6.

12. Since 1993 even Russia has made major sales to Kuwait, including 27 multiple rocket launchers (BM-30). See Vitaly Gelfgat, "Russian Arms Sales to the Middle East," *Policywatch* 406 (26 August 1999): 1–2.

13. UN Security Council Resolution 688 first created the no-fly zones in both the north (above the 36th parallel in April 1991) and in the south (originally to the 32d parallel in August 1992 and expanded to the 33d parallel in August 1996). Resolution 949 created a no-drive zone in the south after Iraq massed troops near the Kuwaiti border in September–October 1994.

14. Farrow interview.

15. Sarao interview.

16. Terry Jones, "Defense Cooperation in the Persian Gulf" (Washington, D.C.: Washington Institute for Near East Policy, 15 July 1996), 36–37.

17. Hughes Aircraft was awarded the $87 million contract to build the integrated radar system during 1998–99. Ericsson of Sweden won a secure-communications contract worth $67 million that will link the GCC states. The combined command and control center remains in the planning stages at present. See John Duke Anthony, "Consultation and Consensus in Kuwait: The 18th GCC Head of State Summit," US-GCC Corporate Cooperation Committee, n.d., 53, 57.

18. Patrick Ryan, "Regional Gulf Security," *Gulfwire*, 4 October 1999 (an online E-mail subscription weekly news service provided by the National Council on US-Arab Relations, Washington, D.C.).

19. Although some people expected the signing of a deal at the Dubai Air Show during November 1999, the principals have not agreed upon the expected $7 billion arrangement (as of this writing), since the UAE continues to negotiate over the price. See Douglas Barrie and Colin Clark, "U.S. Will Oppose Black Shahine on Emirates' F-16s," *Defense News*, 29 November 1999, 4, 36.

20. Patrick Ryan, "UAE Fighter Deal Not Done Yet," *Gulfwire*, 15 November 1999.

21. Gelfgat, 2.

22. Garamone.

23. Jones, 38.

24. CENTCOM official, interviewed by Maj Brent J. Talbot (nonattribution), 1 September 1999.

25. Anthony Cordesman, "The Military Balance in the Middle East—The Southern Gulf by Country: Part XII," *CSIS*, 30 December 1998, 24, 34.

26. As reported by Patrick Ryan, "Bahrain Air Defense Buy," *Gulfwire*, 15 November 1999. See also Anthony Cordesman, "The Military Balance in the Middle East—The Southern Gulf by Country: Part IX," *CSIS*, 30 December 1998, 13.

27. Jones, 37–38.

28. Salim Sultan Al-Ruzaiqi, first secretary, Embassy of Oman, interviewed by Maj Brent J. Talbot, Washington, D.C., 5 May 1999.

29. Jones, 39–40.

30. Al-Ruzaiqi interview.

31. Technological turbulence refers to the efforts by many Gulf states to purchase new military hardware, oftentimes before the last upgrade is fully integrated into the forces. States seek technology for prestige or in an effort to buy allies rather than to improve capability. Anthony Cordesman, comments to the Georgetown University Conference "Buck Rogers or Rock Throwers? Technology Diffusion, International Military Modernization, and the International Response to the Revolution in Military Affairs," 14 October 1999.

32. During the November 1999 Dubai Air Show, GCC officials met and negotiated a joint defense agreement in an effort to create a more credible combined military force. See "Gulf Militaries Make a Big Move," *Global Intelligence Update*, 17 November 1999, 1–2; on-line, Internet, 17 November 1999, available from http://www.stratfor.com/.

33. DOD news briefing, Secretary of Defense William S. Cohen, El-Omayid, Egypt, subject: Bright Star Military Training Exercise, 22 October 1999; on-line, Internet, 21 November 1999, available from http://www.defenselink.mil/news/Oct1999/t10251999_t1022sd.html.

34. "Gulf Militaries Make a Big Move" (see note 32) reported that the GCC states are "striving for an unprecedented level of integration between their militaries" and are "on the threshold of creating a more credible military force." This may be so if one simply looks at the military balance on paper, but the many analysts interviewed by the authors, including US officials from Office of the Secretary of Defense (OSD)/J-5, OSD/Middle East and North Africa Division, CENTCOM, and a number of GCC nationals in Washington embassies as well as Washington think-tank experts, all expressed grave doubts over such predictions and spelled out the many problems that impede integration efforts. Only the Omanis and some Saudis have hope for a bright future of cooperative defense among GCC states. But even these hopes were expressed beyond the near term. All interviews took place during May–September 1999.

35. Dr. John Duke Anthony, chief executive officer, National Council on US-Arab Relations, Washington, D.C., interviewed by Maj Brent J. Talbot, 5 May 1999.

36. Patrick Ryan, "U.S. Defense Chief Visit," *Gulfwire*, 18 October 1999.

37. Michael N. Barnett, "Regional Security after the Gulf War," *Political Science Quarterly*, Winter 1996–1997, 602.

38. Abdul Khaleq Abdulla, "The Gulf Cooperation Council: Nature, Origin and Process," in Michael C. Hudson, ed., *Middle East Dilemma: The Politics and Economics of Arab Integration* (New York: Columbia University Press, 1999), 154–55.

39. Jones learned during an interview with officials in Muscat in December 1995 that the Omanis felt that Saudi rejection of the one-hundred-thousand-man force was due to their belief that this

idea was Sultan Qaboos's ploy to solve the Omani unemployment problem, since the Omanis would make up most of the force. Jones, 58, 63.

40. High-ranking Omani official, interviewed by Maj Brent J. Talbot (nonattribution), May 1999.

41. "Are Saudi Arabia and Bahrain Trying to Depose the Emir of Qatar?" *Mideast Mirror*, 26 January 1996, 12.

42. Jones, 59.

43. State Department official, interviewed by 2d Lt Matthew Van Hook (nonattribution), April 1999.

44. Roy Oliver, "The Crisis of Religious Legitimacy in Iran," *Middle East Journal*, Spring 1999, 211.

45. Several of the Gulf states' embassy officials as well as US policy makers expressed this view. See also Ghabra, "Kuwait and the United States," 306.

46. Abdulla, 151.

47. Paul Noble, "The Prospects for Arab Cooperation in a Changing Regional and Global System," in Hudson, 83–84.

48. Charles William Maynes, "The Middle East in the Twenty-First Century," *Middle East Journal*, Winter 1998; on-line, Internet, 1 October 1999, available from http://209.196.144.55/articles/maynes.html.

49. Ambassador David L. Mack, "U.S. Foreign Policy toward the Middle East," *Middle East Institute Policy Brief*, 14 July 1999; on-line, Internet, 1 October 1999, available from http://209.196.144.55/briefs/mack-bahrain.html.

50. As of this writing, the Security Council has voted to replace the United Nations Special Commission with the United Nations Monitoring, Verification, and Inspection Commission but is still debating who will lead the new organization to oversee Iraqi inspections. It also remains to be seen whether Saddam will allow a return of obtrusive inspections by the new organization. See Barbara Crossette, "Annan Facing Growing Split over Arms Control Inspector for Iraq," *New York Times*, 19 January 2000, A10.

51. Michael Eisenstadt and Patrick Clawson, "Crisis with Iraq: What Now? What Next?" *Policywatch* 355 (25 November 1998): 1.

52. Paul K. White, *Crises after the Storm: An Appraisal of U.S. Air Operations in Iraq since the Persian Gulf War*, Washington Institute for Near East Policy Military Research Papers no. 2 (Washington, D.C.: Washington Institute for Near East Policy, 1999), 63–64.

53. Ibid., 64–65.

54. Gen Anthony Zinni, CINCCENTCOM, speech to the Eighth Annual Middle East Policymakers Conference, Virginia Military Institute, 12 September 1999.

55. Mike MacMurray, OSD/Middle East and North Africa Division, Pentagon, interviewed by Maj Brent J. Talbot, 4 May 1999. Many other US government officials, as well as think-tank experts, have also expressed this view.

56. Timmerman believes that the May 1998 decision to waive the Iran-Libya Sanctions Act sent a weak signal to Iran. See Kenneth R. Timmerman, "Fighting Proliferation through Democracy: A Competitive Strategies Approach Toward Iran" (paper presented at the Seminar on Competitive Strategies and Nonproliferation, US Army War College, 22–25 June 1999, 68; on-line, Internet, 21 May 1999, available from http://www.wizard.net/~npec/frame.htm.

57. For several articles criticizing US sanctions and policy toward Iran, see *Foreign Affairs* 76 (May/June 1997).

58. Martin Indyk, assistant secretary for Near East Asian Affairs, "Iran and the United States: Prospects for a New Relationship," transcript of speech to the Asia Society, Washington, D.C., 14 October 1999, 1–2.

59. Ibid., 2.

60. Ibid., 3.

61. Gelfgat, 1.

62. Patrick Clawson, "Dual Containment as an Effective Competitive Strategy" (paper prepared for the Nonproliferation Policy Education Center, September 1998), 7.

63. Michael Eisenstadt, "Iran's Revolutionary Guard Commander Sends a Warning," *Policywatch* 314 (7 May 1998): 2.

64. Ibid.

65. Due to the lack of control of fissile materials from the former Soviet Union and the shortcomings of intelligence about Iranian capabilities, the potential exists that Iran has the bomb. Still, the Iranian weapons program remains "deeply troubled," according to the latest reports. See James Risen and Judith Miller, "CIA Tells Clinton an Iranian A-Bomb Can't Be Ruled Out," *New York Times*, 17 January 2000, A1, A8.

66. Clawson, "Dual Containment," 8.

67. Ibid., 7.

68. Ibid.

69. Barnett, 607.

70. For an analysis of the rational-actor assumption, see John Spanier and Eric Uslaner's "Foreign Policy in a Democracy," in *Understanding International Relations*, ed. Daniel J. Kaufman, Joseph J. Collins, and Thomas F. Schneider, 2d ed. (New York: McGraw-Hill Inc., 1995), 1255.

71. Noble, 84.

72. This is an often-expressed view in discussions with Arabs, and they frequently refer to Israel as the 51st state. By granting them equal and fair consideration, US policy makers could help alleviate some of the frustrations expressed toward the United States. For example, we often criticize Iraq for failing to conform to UN resolutions but do not hold Israel to the same standards when it comes to returning occupied lands, as called for in UN resolutions.

73. See *Regional Threats*, American-Israel Public Affairs Committee web site; on-line, Internet, available from http://www.aipac.org/result.cfm?id=15.

74. In fact, Scowcroft argues that UN troops on the Golan would not be acceptable to Israel and that buffer troops may be the only way the two states will agree to a peace settlement. If so, US forces are likely to be the only ones acceptable to both sides. Brent Scowcroft, "A U.S. Role on the Golan Heights?" *New York Times*, 6 January 2000, A23. Moreover, as regards strategic Mount Hermon, US analysts present in the intelligence facility on top of the mountain could pass surveillance information to both sides, thus guaranteeing transparency. David E. Sanger, "In No Hurry, Israel-Syria Talks Edge toward Specifics," *New York Times*, 6 January 2000, A3.

75. Ehud Barak, quoted by Deborah Sontag, "Barak Says Talks with Syria Have Reached Critical Juncture," *New York Times*, 12 January 2000, A3.

76. Robert J. Art, "Geoplitics Updated: The Strategy of Selective Engagement," *International Security* 23 (Winter 1998/1999): 80.

77. Ibid., 81.

78. For a discussion of cooperative order and strategic restraint, see G. John Ikenberry, "Institutions, Strategic Restraint, and the Persistence of American Postwar Order," *International Security* 23 (Winter 1998/1999): 45.

79. Art, 82.

80. Col Gerald Thompson, Pentagon J-5, chief, Mid East/Africa Division, interviewed by Maj Brent J. Talbot, 4 May 1999.

81. The Carter Doctrine was articulated by President Jimmy Carter in his 1980 State of the Union address, in which he stated that "any attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States . . . and . . . will be repelled by any means necessary, including military force." See Gary Sick, "The United States and the Persian Gulf: From Twin Pillars to Dual Containment," in Lesch, 280.

82. Dr. Anthony Cordesman, "Conflict and Stability: The Gulf," presentation to the Eighth Annual Mideast Policymakers Conference, Virginia Military Institute, 13 September 1999. The authors agree wholeheartedly with his assessment.

83. Richard N. Haas, "Paradigm Lost," *Foreign Affairs* 74 (January/February 1995): 45.

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The F-16 Block 60

A High-Tech Aircraft for a Volatile Region

CAPT GILLES VAN NEDERVEEN, USAF*

THE F-16 BLOCK 60 is the latest variant of the popular and widely sold F-16. The United Arab Emirates (UAE) ordered 80 aircraft—55 single seaters and 25 dual seaters—for $8 billion (for details, see **http://www.lmtas.com/News/Press/F16/f16pr000305.html**). UAE is buying the most sophisticated version of the F-16 and is investing almost $3 billion of its money into research and development. Writing in

*Capt Gilles Van Nederveen, an associate editor of *Aerospace Power Journal*, is a career intelligence officer who flew on RC-135, EC-130, and E-8 aircraft. He has worked in both national and joint intelligence assignments.

the 13 March 2000 issue of *Aviation Week & Space Technology*, David Fulghum and John Morrocco observe that "this aircraft will be envied by USAF pilots." This sale will also mark the first time that the United States has sold a better aircraft overseas than its own forces fly.

Controversy has surrounded the most advanced version of the F-16 since we announced its sale on 25 May 1999. Some people object to contributing to an arms race in a volatile area, while others oppose the sale of a superior weapon system overseas when the US Air Force itself cannot afford it. To sample the different viewpoints, see the Conventional Arms Transfer Project at **http://www.clw.org/cat/index.html** and the Federation of American Scientists at **http://www.fas.org**. Good background data is available from other aviation-related sites, such as *Air Forces Monthly* at **http://www.airforcesmonthly.com**, *Jane's International Defense Review* at **http://www.janes.com**. and *F-16 News* at **http://www.f-16.net/f16news.html**. For Department of Defense (DOD) information about the sale of the aircraft, associated weapons, and congressional notifications, see **http://www.defenselink.mil/news**.

The Buyer

UAE, actually seven sheikdoms on the western shore of the Persian Gulf (see **http://www.uae.org.ae**), is trying to diversify its arms sources, as have other Persian Gulf states. In the aftermath of Operation Desert Storm, it bought French Mirage 2000s, but a faction in the UAE military pushed for a US fighter. By playing the United States and its European competitors against each other, UAE and other Persian Gulf states have acquired sophisticated weaponry at relatively low cost. After eliminating other modern fighters, such as the Rafale, Eurofighter, and Russian Su-37, UAE chose the F-16.

A unique country sometimes referred to as the "Singapore" of the Persian Gulf because of its workforce and commercial hub, UAE must depend upon outside or Western support because its military is too small to defend against any regional threat. The lack of unity among the seven sheikdoms has divided the command of UAE forces, with the Ministry of Defense located in Dubai and the General Headquarters in Abu Dhabi. Because of its small population base, UAE must continue to rely on Pakistani and British contract pilots and officers to operate its air force.

Anthony Cordesman's *Bahrain, Oman, Qatar, and the UAE: Challenges of Security* (Boulder, Colo.: Westview Press, 1997) charts the growth of UAE's military and the current problems it faces as it tries to expand and modernize in the wake of Desert Storm. Cordesman also explains the complex relations of the entire Persian Gulf, such as the outstanding dispute with Iran over the ownership of the Abu Musa and Tunb islands in the Strait of Hormuz, occupied under the Shah of Iran in 1971 as British forces left the Gulf region in their "East of Suez" pullout.

The Aircraft

The F-16 Block 60, also known as the Desert Falcon, boasts the following features, which set it apart from the most modern Block 50 F-16s in the US Air Force inventory:

- Conformal fuel tanks mounted above the wing root, which allow for a mission radius of 1,025 miles with no in-flight refueling. This amounts to a 40 percent increase over the range of the current Block 50 F-16.

- Internal forward-looking infrared targeting system mounted into the nose of the aircraft, which replaces the external pods on earlier F-16 models. This reduces drag and lowers the radar cross section of the aircraft, making detection by the enemy more difficult.

- Agile-beam radar, which employs an active, electronically scanned antenna to achieve the wide bandwidth necessary to support the Desert Falcon's mission. The radar relies on a fixed panel of transmitters and receptors that can broadcast beams quickly and in every direction.

- Electronic countermeasures suite with internal electronic countermeasures and an electronic-warfare management system designed to foil Russian double-digit surface-to-air missiles such as the SA-10 and SA-12.

- Advanced mission computer to enhance sensor and weapon integration.

- Three five-inch by five-inch color displays in the cockpit and a helmet-mounted cueing system to improve situational awareness of the pilot.

- New F-110-GE-132 engine, which produces 32,000 lb of thrust (see **http://www.f-16.net/reference/versions/f16_cd60.html**).

Missions conducted by Desert Falcons include air superiority, air and maritime surveillance, regional air defense, and precision ground attack. For more information, see Lockheed Martin's web site on all its fighter aircraft programs, including the F-16 Block 60, at **http://www.thefighterenterprise.com**.

The Sale

Difficulties attendant upon the purchase of the Desert Falcons involved (1) "source codes," which allow the reprogramming of onboard avionics, and (2) the ability to carry a standoff attack weapon—especially a cruise missile. The source codes that program the electronic-warfare, radar, and data buses are extremely controversial since the United States never exports them; instead, we will send UAE the "object codes," which will allow it to add to the F-16's threat library (see **http://www.clw.org/cat/pr11-15-99.html**).

After weeks of quiet diplomacy, the US State Department informed France—which wanted to export the Black Shahine—that that standoff weapon was in fact a cruise missile banned under the Missile Technology Control Regime (MTCR). Since its range exceeds 300 km (the current defining limit for cruise missiles under the MTCR), international agreement regulates the export of such weapons. Because the terms of the sale allow the United States to regulate which weapons the F-16s can carry, we made it very clear that Lockheed Martin could not change the data bus to permit the aircraft to carry the Black Shahine. UAE, however, might modify some of its Mirage 2000-5s/-9s to carry the weapon (see **http://www.janes.com**). Furthermore, the AIM-120 advanced medium-range air-to-air missile could have become a hard export, but when Qatar bought the French Mica beyond-visual-range air-to-air missile—the equivalent of the AIM-120—we dropped our objections. The AIM-120 and other state-of-the-art weaponry are now part of a $2 billion weapons package accompanying the F-16 contract (see **http://www.defenselink.mil/news/Sep1998/m09161998_m143-98.html**).

UAE also sees the Desert Falcon acquisition as a prestige issue, since all Persian Gulf countries have made or are in the process of making further purchases of fighter aircraft. Additionally, UAE will allow the US Air Force to use the new base that will house the 80 F-16s. According to the DOD statement accompanying the notification of sale to Congress, UAE has become a key regional ally who will help the United States with basing, access, and pre-positioning of material.

Supporting the sale, DOD has agreed that the Air National Guard at Tucson, Arizona, will conduct the initial cadre training. In addition, because of the UAE air force's concern about the lag between contract signing and aircraft delivery, it intends to purchase 20 Dutch F-16As/Bs for training and familiarization purposes prior to the arrival of the newly built Desert Falcons. Although some parties consider the sale of the F-16 Block 60s controversial, in reality it enhances the capabilities of a key US regional partner and gives US Air Force expeditionary forces seamless integration in a crisis. □

No soldier can fight properly unless he is properly fed on beef and beer.

—Duke of Marlborough, 1650

The Articles of War and the UCMJ

MAJ LISA L. TURNER, USAF*

LT WILLIAM R. SINCOCK and Lt Theodore Q. Balides were not the first US servicemen to mistakenly drop bombs on a neutral country during World War II.[1] They were, however, the first and apparently only airmen to be court-martialed for dereliction of duty as a result of such an incident.[2] Their court-martial is not surprising, given that approximately one court-martial was convened for every eight service members who served in the US armed forces during World War II.[3] It was unusual that they were afforded defense counsel and subsequently acquitted because at that time, there was no right to a defense lawyer and there were more than 60 general court-martial convictions for each day of hostilities.[4] Those staggering numbers exposed millions to the military criminal system under the Articles of War. When those citizen-soldiers returned from World War II, a hue and cry went up in the nation to dramatically reform the system of military criminal law.[5] As a result, the Uniform Code of Military Justice (UCMJ) was enacted and signed into law by President Harry Truman on 5 May 1950.[6] This year, we celebrate the 50th anniversary of the UCMJ, a system that balances the need of the commander to ensure good order and discipline in the armed forces and the American traditions of due process and fairness.

In addition to concerning themselves with the UCMJ, service members who leave the boundaries of the United States must not only understand the UCMJ but also familiarize themselves with the laws of foreign countries and of the international community. Under some circumstances, a foreign country will retain the right to prosecute members of the US armed forces for violations of the host nation's criminal laws. This concept is known as foreign criminal jurisdiction. Switzerland did not attempt to prosecute Lieutenants Sincock and Balides; however, other nations have prosecuted US service members. International law also impacts the legality of a service

member's actions. The Law of Neutrality prohibited intentional bombing of Switzerland during World War II and of the Chinese Embassy in Belgrade, Yugoslavia, during Operation Allied Force. In some instances, the international community has the right to prosecute alleged war crimes.

The Uniform Code of Military Justice

It would be pure speculation to ask whether Lieutenants Sincock and Balides would be court-martialed under the UCMJ for the bombing of Zurich and the resultant deaths of innocent civilians. What is certain is that today they would find a substantially different system with significantly increased rights and protections. The UCMJ was a significant break with tradition. It replaced almost unfettered command authority in the criminal justice arena with a system of justice that recognized the need to balance individual rights under the American tradition of fairness and due process with the command need to ensure good order and discipline.

Prior to the UCMJ, the Army and Navy had their own governing criminal statutes. The court-martial of Lieutenants Sincock and Balides occurred under the Army Articles of War, which were founded upon a tradition of commander-centered discipline reaching back through history. Personnel in the Navy and Marine Corps were tried under the Articles for the Government of the Navy. The Articles of War and the Articles for the Government of the Navy as originally adopted by the Continental Congress in 1775 were developed out of ancient military codes that centered upon the right and necessity of a military commander to exercise strong disciplinary measures when he saw fit.[7] Courts were viewed as tools of the commander, and little thought was given to protecting the rights of an accused.[8]

Many of the over 16 million men and women who served in the United States armed forces during World War II, including civilian lawyers, left the services with a poor view of the Articles of War. The American Bar Association, American Legion, and other private organizations spoke out for reform, as did citizenry across the nation. The result was a significant reformation of the system with the creation and enactment of the UCMJ.[9] Each subsequent refinement of the UCMJ has afforded members of the armed forces more protections. In the all-volunteer force of today, 2.39 service members per thousand are court-martialed in the Air Force,[10] a fraction of those court-martialed during World War II. There were a total of only 851 courts-martial of all types in the Air Force in calendar year 1999.[11]

The present military justice system intentionally incorporates as many of the commonly recognized federal criminal procedural and evidentiary rules as possible.[12] For example, although Col James M. Stewart was the presiding officer for *United States v Sincock and Balides*, a revision to the Manual for Courts-Martial (MCM) instituted the use of military judges.

Lieutenants Sincock and Balides were fortunate to have a lawyer on their defense team, because there was no right to a lawyer under the Articles of War. Today, military members have greater rights to an attorney than our civilian counterparts. Military members are afforded a qualified defense counsel free of charge in all special and general courts-martial, whereas civilians are provided counsel free of charge only when their financial situation is such that it warrants it. Even before the civilian case that resulted in the familiar "Miranda Rights," the UCMJ applied the right to remain silent (Article 31) to the military. Even now, Article 31 affords more protection to a member of the military who is suspected of an offense and is being questioned for official law enforcement or command purposes than a similarly situated civilian who is being questioned by the police. Our military justice system protects the individual through these and a variety of other measures, many of which were recognized in the military forum years before they were granted in civilian criminal trials.[13]

Just as the UCMJ protects the rights of members of the armed forces, it is also a tool for the commander to ensure discipline and obedience of lawful orders.[14] Without means of accountability, such as the UCMJ, there could be no effective military discipline. The commander is inextricably involved in the military justice system and the needs of the military, and the accused are better served by his or her involvement.[15] He or she knows the business of the accused and is in a significantly better position than a civilian prosecutor to determine whether a case should go to trial.[16] What service member would want only lawyers deciding what cases should go to trial for dereliction of duty, rather than a commander who knows and understands the job of the suspect? Additionally, through the commander's involvement, service members are again afforded more protections than their civilian counterparts. The convening authority, in his or her sole discretion, can lessen or dismiss any finding of guilt and reduce or eliminate the sentence adjudged by the criminal tribunal. He or she cannot, however, increase the punishment.[17]

Examining a few incidents that could, or have, resulted in dereliction of duty and other charges may be instructive. The command structure first receives information of a potential criminal act through any number of means, such as an Air Force Office of Special Investigations report, a Security Forces Investigations report, or an Accident Investigation Board report. For example, the Accident Investigation Board for the C-130E crash that occurred on 10 December 1999 at Ahmed Al Jaber Air Base, Kuwait, found "by clear and convincing evidence, that the cause of the mishap was the crew's failure to follow governing directives and complacency in flight operations."[18] The Accident Investigation Board report was forwarded to the General Courts-Martial convening authority for him to "determine what if any punitive or administrative action should be taken against persons whose negligence or misconduct contributed to the accident."[19]

After receiving a preliminary report of alleged criminal conduct, the command structure evaluates the information to determine whether additional facts should be developed or if disciplinary or administrative action should be initiated. The Office of the Staff Judge Advocate assists in this evaluation and provides a recommendation. An adverse investigative report does not automatically result in a trial. It is also important to remember that a court-martial is not in and of itself punishment. Just like a civilian trial, a court-martial is simply a forum for the presentation of facts; their application to law; findings as to guilt or innocence; and finally, if the accused is convicted, adjudication of an appropriate sentence. Referring charges to a court-martial does not warrant any inference of guilt, as the judge carefully instructs the members in every trial in which the accused pleads not guilty.[20]

Military members whose acts or omissions rise to the level of criminally negligent behavior can be tried for dereliction of duty under Article 92 of the UCMJ. People do make mistakes in the learning process. However, when their errors rise to the level of criminal dereliction of duty, commanders have an obligation to hold people accountable for their acts or omissions. The military justice system is a key to combat readiness and capability:

> We're entrusted with the security of our nation. . . . The tools of our trade are lethal, and we engage in operations that involve risk to human life and untold national treasures. . . . Because of what we do our standards must be higher than those of society at large. . . . The American public expects it of us and properly so. In the end, we earn the respect and trust of the American people because of the integrity we demonstrate.[21]

We accept a level of risk by the inherently dangerous nature of the profession of arms. Members of the armed forces are prepared to and regularly do make sacrifices for our nation. However, we cannot and should not have to accept increased risks or finally make the ultimate sacrifice because of a person's laziness or gross dereliction. All service members, from the intelligence officer, targeteer, munitions troop, maintainer, navigator, to the pilot must diligently perform their phase of the job. Each of us relies on the other to accomplish the mission.

To prove dereliction of duty under Article 92, UCMJ, the government has to prove, beyond a reasonable doubt, that the accused had certain duties; he or she knew or reasonably should have known of those duties; and he or she was either willfully or through neglect or culpable inefficiency derelict in the performance of those duties. The MCM explains that "a duty may be imposed by treaty, statute, regulation, lawful order, standard operating procedure, or custom of the service."[22] It goes on to explain that "actual knowledge of duties may be proved by circumstantial evidence and need not be shown if the individual reasonably should have known of the duties. . . . This may also be demonstrated by regulations, training or operating manuals, customs of

the service, academic literature or testimony, testimony of persons who have held similar or superior positions, or similar evidence."[23] Acts or omissions sufficient to sustain a finding of guilt for negligent dereliction of duty are judged by the care or lack of care a reasonably prudent person would have exercised under the same or similar circumstances. "Culpable inefficiency is inefficiency for which there is no reasonable or just cause."[24] It is important to note that a person is not derelict if he or she is simply inept at performing duties. The MCM gives the example that if a recruit who tries hard during rifle training cannot qualify, he or she is only inept and not guilty of dereliction of duty.[25]

Each service member is held accountable only for his or her phase of the mission and not for an error by someone else. The 7 May 1999 bombing of the Chinese Embassy in Belgrade is a prime example.[26] The mission was to attack the headquarters of the Yugoslav Federal Directorate of Supply and Procurement, and the building, as such, was a legitimate military target.[27] The pilots putting bombs on target were properly performing their duties and have not been court-martialed, nor will they be.[28] Errors were instead made in the techniques used to locate the target.[29] "None of the military or intelligence databases used to validate targets contained the correct location of the Chinese Embassy. Nowhere in the target review process was a mistake detected."[30] There were no indications during collaborative discussions by the targeting cell that the target was anything other than what the Central Intelligence Agency (CIA) said it was.[31] Since the bombing was unintentional and not a result of military dereliction, no members of the armed forces will be disciplined.[32] Instead, the CIA officials whose errors led to the bombing were held accountable under their system.[33]

When dereliction-of-duty cases go to trial, it is often as a result of accidents or willful behavior that results in deaths, serious injuries, or significant property losses, just as in the court-martial of Lieutenants Sincock and Balides. Their accidental bombing of Zurich not only "represented the deepest penetration of Switzerland by attacking United States bombers during the war,"[34] it resulted in the deaths of five people, hospitalization of 12 additional people, total destruction of two homes, severe damage of other homes, and the rendering of approximately 22 people homeless.[35] It also occurred on the same day as the accidental bombing of Basel, Switzerland, and after a series of accidental bombings of Switzerland by US bombers starting in 1943.[36]

The court-martial and conviction of a ship's navigator whose dereliction resulted in running the ship aground and its destruction is yet another example.[37] Certainly, other navigators have been derelict and have taken a ship off course, but it was the dereliction that had significant impact that resulted in a court-martial. A more recent example is the 1989 court-martial of a Marine lieutenant. Undoubtedly there have been occasions when troops were temporarily unaccounted for, yet the officer in charge is

not always court-martialed. However, when a young lance corporal died of exposure in the California desert, the Marine lieutenant responsible for posting and recovering his troops during a tactical exercise was court-martialed and convicted of dereliction of duty.[38]

Had Lieutenants Sincock and Balides been found guilty of dereliction of duty, they could have been sentenced to a maximum punishment of dismissal, forfeiture of all pay, and confinement for life. Today, the maximum punishment for violation of dereliction of duty (Article 92, UCMJ) is less severe and dependent upon whether the accused was willfully derelict. If the dereliction of duty was intentional (willful), he or she can be confined for up to six months and made to forfeit all pay and allowances. If the accused is enlisted, he or she can also be sentenced to a bad-conduct discharge. If the dereliction was not willful, the maximum imposable sentence is forfeiture of two-thirds pay per month for three months and confinement for three months; a punitive discharge is not authorized.

In cases involving damage to property, injury, or death, the accused can also be charged with other offenses such as murder by an act inherently dangerous to another, involuntary manslaughter, or negligent homicide.[39] As one might expect, the maximum punishments for these offenses range from three years to life in confinement. An example of murder while engaged in an act inherently dangerous to others is found in the conviction of a soldier for the death of an unarmed civilian woman during a "sham" firefight he and some of his friends entered into during Operation Just Cause to cover his loss of a pistol.[40] The MCM gives an example of this wanton disregard for human life as "flying an aircraft very low over one or more persons to cause alarm."[41]

In certain cases, acts or omissions can result in nonjudicial punishment under Article 15 of the UCMJ—commonly referred to in the Air Force as "Article 15s"—or other administrative actions. For example, 10 individuals received administrative letters of either reprimand, admonition, or counseling as a result of the 14 April 1994 shootdown of two US Army Black Hawk helicopters during Operation Provide Comfort in northern Iraq.[42]

Commanders have also been held accountable for dereliction of duty, and their punishments have run the gamut from administrative actions such as reprimands, being "red-lined" (promotion cancellation), and relieved of command, up to disciplinary action or court-martial. An example is the court-martial of the Fairchild AFB Operations Group commander following the 24 June 1994 crash of a B-52H and deaths of all four aircrew members aboard.[43] Three months before the crash, the pilot repeatedly and intentionally flew well below published clearances, once flying the B-52H in a pass less than 50 feet above the ground and twice flying so low that the copilot seized control of the B-52H to avoid impacting the ridgeline. After the aircrew went to the squadron

commander and refused to fly with the pilot again, the squadron commander notified the group commander of the incident and recommended that the pilot be grounded. The squadron commander went so far as to tell the group commander that he would like to ensure that squadron crews never flew with the pilot again because of his lack of air discipline. Other members of the wing also approached the group commander about the pilot's inappropriate flying. The group commander declined to ground the pilot. Additionally, the group commander and wing commander were briefed by the pilot on the flight profile he planned to fly at an upcoming air show. They approved a profile of bank-and-pitch patterns in violation of established directives. The crash occurred at the end of a practice flight for the air show. The group commander pled guilty to dereliction of duty. Other members of the wing were disciplined; one received an Article 15, and others were reprimanded.[44]

Lieutenants Sincock and Balides were acquitted of all charges, despite the substantially different system that we are familiar with today. Commanders then were known to mark prosecutors down in their performance reports if they lost cases and to require court-martial members to reopen a case after a finding of not guilty and return a guilty verdict. Today, under the MCM, unlawful command influence is strictly prohibited, and "no convening authority or commander may censure, reprimand, or admonish a court-martial or other military tribunal or any member, military judge, or counsel thereof, with respect to the findings or sentence adjudged."[45] Additionally, all military members are prohibited from "attempt[ing] to coerce or, by any unauthorized means, influence the action of a court-martial . . . or any member thereof, in reaching the findings or sentence in any case."[46] Thus, acquittals, such as that of the airborne warning and control system (AWACS) crew member acquitted of dereliction of duty following the shootdown of the Army helicopters in Operation Provide Comfort, are accepted as part of the functioning system and evidence that the system is fair to individuals.[47]

Foreign Criminal Jurisdiction

In addition to being subject to US law, military members may be subject to the laws of other nations. Upon discovering they had bombed Zurich, Lieutenants Sincock and Balides may have wondered if they would be prosecuted in Swiss criminal courts. When a military member deployed or operating abroad allegedly commits a crime in another country, the question arises as to which country has the authority to try the individual. This concept is called "foreign criminal jurisdiction" and is of significant interest to deployed commanders and individuals.

It is the policy and practice of the United States to try to obtain jurisdiction and allow the United States military to take appropriate

action.[48] There were apparently no efforts to prosecute Lieutenants Sincock and Balides in Swiss courts. However, there have been efforts by other nations on other occasions to exercise criminal jurisdiction over US servicemen and servicewomen, as in the case of the 3 February 1998 accident involving the US Marine Corps EA-6B Prowler jet on a low-altitude training flight in Italy that severed a ski gondola cable, causing the cable car to plunge to the ground, killing 20 people.[49] An Italian prosecutor tried but failed to obtain jurisdiction over the aircrew and others in the chain of command. The Italian court dismissed the indictments for lack of jurisdiction.[50] Italy was not the proper place for the trial, in accordance with the North Atlantic Treaty Organization Status of Forces Agreement (NATO SOFA), since the United States had the primary right to jurisdiction "in relation to . . . offenses arising out of any act or omission in the performance of official duty."[51] The United States exercised criminal jurisdiction, and the pilot was prosecuted and acquitted on charges of involuntary manslaughter, dereliction of duty, and destroying private and government property; thereafter, similar charges against the navigator were withdrawn. Both men were convicted of charges of obstruction of justice and conspiracy to obstruct justice arising from the destruction of a videotape recording of the flight by the navigator at the direction of the pilot.[52]

The question of who has jurisdiction depends upon a variety of factors, primarily based upon which countries are involved and what, if any, international agreements they have entered, such as the NATO SOFA. Since the UCMJ allows military members to be held accountable for their behavior wherever in the world they may be deployed or permanently assigned,[53] other nations are more willing to release US service members to the United States than they might otherwise be.

International Law and the Law of Neutrality

As the article "The Bombing of Zurich" mentions, Switzerland remained outside the conflict during World War II and as such was a neutral party. International law of armed conflict imposes duties on and grants rights to neutrals.[54] Generally, belligerents may not enter the territory of a neutral.[55] Certainly, had the bombing of Switzerland by the United States during World War II been intentional, it would have been a war crime.[56] In some instances, the international community has jurisdiction to prosecute alleged war crimes. Crimes against the peace, crimes against humanity, and war crimes were tried in both the European and Pacific theaters as a result of actions taken during World War II.[57] A more recent example is the International Criminal Tribunal for the former Yugoslavia, which has jurisdiction of alleged war crimes in that country.[58]

Because the bombing of Zurich was not intentional, it was not a war crime. No member of the crew was prosecuted by an international

tribunal. Likewise, although Chinese news reports and rhetoric called the bombing of the Chinese Embassy a premeditated war crime, it was not the intentional bombing of a neutral.[59] Ms. Carla Del Ponte, the UN's chief war crimes prosecutor, recently told the Security Council that "although some mistakes were made by NATO, I am very satisfied that there was no deliberate targeting of civilians or unlawful military targets by NATO during the bombing campaign."[60] The bombing was in no way a violation of the Law of Armed Conflict and is therefore not a crime under international law.[61] Accordingly, the bombing of the Chinese Embassy was likewise not prosecuted under international law.[62]

Conclusion

Gen George Washington said, "Discipline is the soul of the Army."[63] However, discipline is not possible without justice. The system of military justice we operate under today is both just and tailored to fill the unique needs of the military community. Its purpose "is to promote justice, to assist in maintaining good order and discipline in the armed forces, to promote efficiency and effectiveness in the military establishment, and thereby to strengthen the national security of the United States."[64]

The question How could such events happen? was asked about the bombing of Zurich and about the bombing of the Chinese Embassy and will inevitably be asked in future conflicts. When that question is asked, members of the armed forces today are fortunate to be governed by the UCMJ rather than by the Articles of War that regulated the actions of Lieutenants Sincock and Balides. We are also fortunate to be part of a nation that aggressively works to protect its service members in the realms of foreign criminal jurisdiction and international law. □

Maxwell AFB, Alabama

Notes

1. The reference is to the unintentional bombing of Zurich, Switzerland, in World War II. See Jonathan E. Helmreich, "The Bombing of Zurich," *Aerospace Power Journal* 15, no. 2 (Summer 2000): 92–108; and James M. Spaight, *Air Power and War Rights* (New York: Longmans, Green, 1947), 431.

2. See generally Jonathan E. Helmreich, "The Diplomacy of Apology: United States Bombings of Switzerland during World War II," *Air University Review* 28, no. 4 (May–June 1977): 19–37.

3. Brig Gen John S. Cooke, USA, Retired, "Military Justice and the Uniform Code of Military Justice," *Army Lawyer*, March 2000, 2; Hon. Walter T. Cox III, "The Army and the Constitution," *Military Law Review* 118 (1986): 11, note 67; and Capt John T. Willis, "The United States Court of Military Appeals: Its Origin, Operation, and Future," *Military Law Review* 55 (1972).

4. Cox, 7.

5. Ibid., 2.

6. Public Law 506, 81st Congress, c.169 § 1, 64 Stat. 108; Title 50 USC (chap. 22) §§ 551–736, The Manual for Courts-Martial (MCM), United States, 1951, was prescribed by Executive Order 10214 signed by President Truman on 8 February 1951. The MCM became effective on 31 May 1951.

7. Cooke, 1.

8. Ibid.

9. The Uniform Code of Military Justice (UCMJ) took effect on 31 May 1951.

10. Telephone interview with Ms. Hattie Simmons, Air Force Legal Service Agency, Military Justice Division, 17 May 2000.

11. Ibid.

12. Appendix 21, "Analysis of Rules for Courts-Martial," MCM, A21-1 (1998); appendix 22, "Analysis of the Military Rules of Evidence," MCM, A22-2 (1998); Article 36, UCMJ (1998).

13. For example, the right to a qualified attorney was not recognized for some 12 years after it was granted in the military context. *Gideon v Wainwright*, 372 US 335 (1963). Military members had the right against self-incrimination more than 15 years prior to its recognition in the civilian community in the familiar case of *Miranda v Arizona*, 384 US 436 (1996).

14. See *Curry v Secretary of Army*, 595 F2d 837 (D.C. Cir 1979).

15. He or she convenes the court-martial and selects the members in accordance with the UCMJ. After a conviction, he or she reviews the case and sentence. He or she may approve or reduce the sentence of the members. He or she can even set aside the sentence or conviction. He or she cannot make the sentence harsher.

16. In most civilian criminal systems, the prosecutor, whether that be the district attorney, the attorney general, or another office of prosecutors, determines what cases should go to trial.

17. Rule for Court-Martial 1107, Action by the Convening Authority (MCM, 1998 edition).

18. US Air Force, Class A Flight Mishap Accident Investigation Board Report: C-130E, Tail Number 63-7854 (20 March 2000). The board found that "the crew violated AFI 11-202V3 when they elected to fly a published approach . . . when the weather required for the approach was below the required minimums. The crew violated Air Force Manual (AFMAN) 11-217, *Instrument Flight Procedures*, when they failed to contact the Al Jaber AB tower to check weather prior to beginning their en route descent. The pilots violated AFMAN 11-217 when they failed to monitor their flight instruments during night conditions on the approach to Al Jaber AB. . . . The pilot deviated from Air Force directives when he did not wear his glasses to fly" (page 20 of the accident report).

19. Air Force Instruction 51-503, *Aircraft, Missile, Nuclear & Space Accident Investigations*, 1 December 1998. Note: The Air Force uses the term *accident investigation* in lieu of *legal mishap investigation*. The Army uses the term *collateral investigation*, and the Navy uses the term *JAGMAN (JAG) Manual investigation*.

20. Department of the Army Pamphlet 27-9, *Military Judges' Benchbook*, 30 September 1996, 42.

21. Gen Ronald R. Fogleman, Air Force chief of staff, "The Bedrock of Integrity," remarks to the US Air Force Academy, Commander Leadership Series, 8 November 1995.

22. Par. 16c. (3), MCM (1998), IV-24.

23. Ibid.

24. Ibid.

25. Ibid.

26. See DOD Report to Congress, *Kosovo/Operation ALLIED FORCE After-Action Report*, 31 January 2000 (unclassified); statement of Hon. John J. Hamre, Deputy Secretary of Defense, before the House Permanent Select Committee on Intelligence, 22 July 1999.

27. *Kosovo/Operation ALLIED FORCE After-Action Report*, xx.

28. Jamie McIntyre, Pentagon correspondent, "No Punishment for Bombing of Chinese Embassy in Belgrade," Cable News Network (CNN), 11 April 2000.

29. MCM (1998), xx.

30. Ibid.

31. Lt Col Tony E. Montgomery, deputy staff judge advocate, Headquarters European Command, to the author, E-mail letter, subject: [Chinese Embassy Bombing], 22 May 2000.

32. See generally McIntyre, CNN.COM, 11 April 2000; Supra, note 29.

33. McIntyre, note 30.

34. Helmreich, "Diplomacy of Apology," 33.

35. Ibid., 36, note 47.

36. Ibid., passim.

37. *United States v Sievert*, 29 CMR 657 (2 December 1958).

38. *United States v Lawson*, 33 MJ 946 (NMCMR, 1991).

39. Murder is in violation of Article 118; manslaughter in violation of Article 119; and negligent homicide in violation of Article 134.

40. *United States v McMonagle*, 34 MF 852 (ACMR, 1992).

41. Article 118, c(4)(a), MCM (1998), IV-64.

42. Operation Provide Comfort: Review of U.S. Air Force Investigation of Black Hawk Fratricide Incident Testimony, 06/18/98, GAO/T-OSI-98-13. The administrative actions were subsequent to six Article 32 UCMJ investigations and a court-martial.

43. The vice wing commander, the pilot's squadron commander, and the senior navigator on base also died in the crash.

44. Charge sheet, 30 September 1994, *United States v Pellerine*; Stipulation of Fact, 18 May 1995, signed by the counsel and accused; interview with Lt Col Gregory E. Pavlik, trial counsel for *United States v Pellerine* at Maxwell AFB, Ala., 12 April 2000.

45. Rule for Court-Martial 104, Unlawful Command Influence, MCM (1998).

46. Ibid.

47. See generally Maj Dawn R. Eflein, "A Case Study of Rules of Engagement in Joint Operations: The Air Force Shootdown of Army Helicopters in Operations Provide Comfort," *Air Force Law Review* 44 (1998): 33.

48. See generally Maj Steven J. Lepper, "A Primer on Foreign Criminal Jurisdiction," *Air Force Law Review* 37 (1994): 169.

49. Associated Press, "Top Italian Court Says No Authority Exists for Civil Suit over Cable Car Crash," CNN, n.p.; on-line, Internet, 4 August 2000, available from http://www.cnn.com/etv/cwc/WORLD/europe/story2.html.

50. Estes Thompson, "Marine Pilot Acquitted of All Charges in Gondola Case," *Washington Post*, 4 March 1999; interview of Cesare De Carlo, *Online NewsHour* (web site of the *NewsHour with Jim Lehrer*), Public Broadcasting System, 4 March 1999, n.p.; on-line, Internet, available from http//www.pbs.org/newshour/bb/military/jan-june99/trial_3-4.html.

51. Agreement between the Parties to the North Atlantic Treaty Regarding the Status of Their Forces, 19 June 1951, Article VII, par. 3(a)(ii).

52. The pilot was sentenced to six months in prison, and the navigator was sentenced to dismissal from the Marine Corps. Lecture at Interservice Military Judges Seminar, Air Force Judge Advocate General School, Maxwell AFB, Ala.,1999.

53. *Solorio v United States*, 483 US 435 (1987), and progeny.

54. L. C. Green, *The Contemporary Law of Armed Conflict* (New York: St. Martin's Press, c.1993), 258.

55. See ibid., passim.

56. Ibid.

57. Ibid.

58. The International Criminal Tribunal for the Former Yugoslavia (ICTY) receives its authority from United Nations Security Council Resolution (UNSCR) 827, which established "an international tribunal for the sole purpose of prosecuting persons responsible for serious violations of international humanitarian law committed in the territory of the former Yugoslavia." The ICTY investigates alleged crimes occurring on or after 1 January 1991. UNSCR 1244 (10 June 1999) "demands full cooperation by all concerned, including the international security presence, with the International Tribunal."

59. Par. 16c (3), MCM (1998), IV-24.

60. Barbara Crossett, "U.N. War Crimes Prosecutor Declines to Investigate NATO," *New York Times*, 3 June 2000.

61. "China Calls for New Investigation of Embassy Bombing," 8 May 2000, n.p.; on-line, Internet, 4 August 2000, available from http://www.cnn.com/2000/ASIANOW/east/05/07/china.us.embassy.

62. Green, passim. On 30 December 1999, the Office of the Prosecutor for the International Criminal Tribunal for the Former Yugoslavia stated, "There is no formal inquiry into the actions of NATO during the conflict in Kosovo."

63. Cooke, 6.

64. Preamble to the 1998 edition of the Manual for Courts-Martial, United States, I-2.

A New Role for Today's UAVs

2D LT DAVID ORTIZ, USAF*

TODAY'S AIR FORCE is smaller than the service of yesterday, but few people would doubt that it has a much greater ability to prosecute an air war—projecting more power, faster, with increased survivability. This is due in part to our abundance of real-time battlefield intelligence and platforms from which to collect that intelligence. With this overwhelming ability to collect information comes disagreement on the best way to employ our intelligence collection and airborne early warning (AEW) platforms. This article offers another view on how to better employ proven AEW platforms and relatively new assets in the Air Force inventory, namely our unmanned aerial vehicles (UAV).

Recently, my class for airborne warning and control system (AWACS) aircraft air-weapons officers received a briefing on today's UAV fleet and its employment. I had listened to lectures on UAVs before, but this time I was more cognizant of the employment considerations of high-value airborne assets (HVAA) such as the E-3 AWACS; E-8 joint surveillance, target attack radar system (JSTARS); and Rivet Joint aircraft. The instructors talked about UAV systems such as the Predator and Global Hawk, stressing their many capabilities for collecting battlefield data. I wondered what we AWACS crew members could do with this collected data to enhance our tactical situational awareness. I was shocked to find out that the answer was *not much at all.* Since aircraft in the UAV fleet are designed for target tracking, communications relay, electronic intelligence, and search and rescue, why could they not coordinate the collection of information and share it with their larger, manned counterparts?

To explore this question further, I considered an idea from the early 1990s TV show *Sea Quest.* In this short-lived program, a large submarine vessel, the *Sea Quest,* received assistance in its day-to-day operations from "whiskers"—small, unmanned vehicles that extended the eyes and ears of the parent vessel. They lived up to their name by providing the fictional ship with constant data, helping it see around corners, cross-check shipborne sensors, and employ ordnance, thus making themselves essential to mission accomplishment. This concept of hardware symbiosis could teach the military a great deal. Indeed, the Navy already has learned from it: in 1996 the USS *Chicago* tested a whisker system via an ultrahigh-frequency satellite-communications link.[1] The only difference was that it

used airborne whiskers—specifically, a Predator UAV aircraft linked to the submarine, giving it detailed imagery one hundred nautical miles deep into enemy territory. The system could also highlight information on surface targets and movements of enemy ships.[2] In a sense, the link provided a 15,000-foot periscope for the *Chicago.*

Putting all this together, I asked myself whether the Air Force could exploit this concept that already has real-world support. Could we use a set of two or three dedicated UAVs to enhance the mission employment of today's AEW platforms? Can an idea from a futuristic Navy be applied to today's Air Force? Given the varied capabilities of UAVs, I think the Air Force can enhance the mission at hand.

To further prove my point, I looked to the Red Flag range at Nellis AFB, Nevada, for ideas that would integrate AEW and UAV platforms in a combat/collection relationship. This range offers sporadic mountains, with valleys spanning the distance between them. The shadows of these ridges provide perfect hiding places for relay stations, troop convoys, and antiaircraft positions. Knowledge of their location is essential for avoidance and targeting by friendly forces; although our AEW platforms were specifically designed to detect such enemy emissions, restraints on those platforms do not always allow this. Sometimes we may miss coverage due to a shortage of aircraft, and sometimes other mission requirements demand orbits that do not optimize our collection capabilities. Oftentimes the answer is not more aircraft because the platforms cannot fly close enough to the forward edge of the battle area or over sensitive areas to retrieve this information.

Furthermore, because the E-3 has many capabilities, it carries a varied crew with differing needs in orbit. For example, the weapons section most likely would prefer an orbit oriented perpendicularly to the threat axis to take full advantage of onboard sensors providing information on enemy fighters heading in their direction. However, concerns over air defense assets, which might find the mountain valleys excellent places to wait in ambush for our aircraft, may dictate a different orbit—one that conforms to the terrain rather than the threat in order to detect emissions. AEW platforms continually make these trade-offs between support for the military mission and limits imposed by physics and geography. (They also practice risk management by not placing such an HVAA too close to the threat.) Such compromise invariably degrades collection, detection, and identification.

To counter these problems, the Air Force could employ an AEW/UAV combat-cooperation program so that the larger AEW platforms could conduct some of their mission taskings from afar, freed from dangerous line-of-sight problems by using UAV augmentation. Just think, a Rivet Joint and E-3 could support an East-West war on the Nellis range, while dedicated scout UAVs patrol the valleys between the mountain ranges (which run predominantly north-south). Ground or airborne emitters that

previously would have gone unnoticed could now be identified and reported, and emissions from threats in known locations might be detected much faster. UAVs could also provide earlier detection and tracking of low-flying aircraft traversing these ridges, keeping the E-3 updated via datalink. In a signals-intelligence role, UAVs could triangulate faster, and in a search-and-rescue or optical-collection role, they could use real-time video imaging and spot cameras to help the JSTARS get a closer look at troop advancements, downed airmen, enemy vehicles, or bunkers. Real-time battlefield identification could become more accurate and expedient, giving field commanders an added tool on the battlefield. The objective here is to create a highly adaptable system that would help minimize line-of-sight and orbit restrictions—the possibilities are virtually endless. Experts in the two communities could communicate and determine what different types of UAVs would best supplement their HVAA counterparts, whether E-3, Rivet Joint, JSTARS, Compass Call, and so forth—the list goes on.

But we cannot realize such an increase in capabilities without overcoming some associated problems. The remainder of this article mentions three of them and offers possible solutions to some of these very complex issues.

First in everyone's mind is money. How can we justify the cost of fielding new UAVs and integrating them with existing platforms? Well, if we implement a UAV/HVAA program, the increase in capability may result in a drop in HVAA deployments. Also, even though development costs can be significant, the Air Force and members of the private sector are currently testing more than 32 UAV/drone aircraft for future use.[3] Those UAV programs already under way represent such a variety of capabilities that we may be able to identify and tailor a UAV to meet our requirements, resulting in a lower research-and-development budget than one might expect.

A second problem involves space on the HVAA platforms. AEW aircraft are already packed with equipment and personnel. Although I am less knowledgeable about the crew complement and space on other airframes, I do know that the crew complement of an E-3 is much like that on any other aircraft: it depends upon the mission of the day. To solve the space problem, I offer that we could tailor UAV control equipment to the mission consoles already available on the jets.
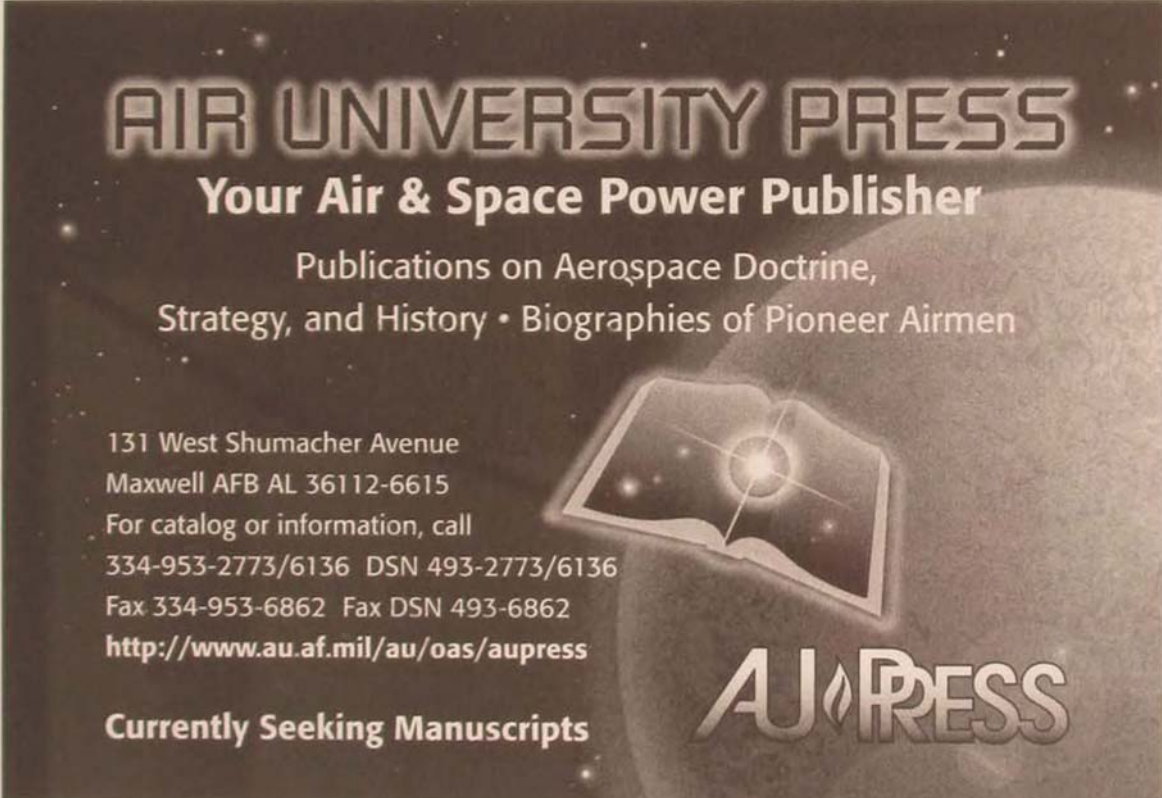
Finally, training would pose a challenge. I recommend that we test a potential AEW/UAV combat relationship at Nellis—and do it soon, rather than under the pressure of some future conflict. The concept isn't too far-fetched because the Predator is already scheduled to begin exercises at the Red Flag range. In fact, the Air Force's 11th and 15th Reconnaissance Squadrons, stationed at Nellis, already fly the Predator UAV system. They would be the real experts on how best to integrate UAVs with larger AEW platforms.

I hope this idea or similar ones find merit in the minds of today's planners. The concept could have a wide-ranging effect on deployments, intelligence collection, combat search and rescue, and myriad other problems facing the United States Air Force. □

Oklahoma City, Oklahoma

Notes

1. Don Herskovitz, "Sampling of Unmanned Aerial and Remotely Piloted Vehicles," *Journal of Electronic Defense* 21, no. 5 (May 1998): 62.
2. Ibid.
3. Ibid.

Ricochets and Replies
Continued from page 4

and military culture foster the view that debate is often inefficient and inconvenient. Certainly for those charged with implementing plans, programs, or policies, some debate will hit too close to home. Finally, a few people, through ignorance or partisanship, even question the reason for having a professional journal—why nurture dissent in the service or make counterarguments or vulnerabilities available to the opposition?

While it is easy to see how apathy or, worse, outright hostility to *APJ* or its mission can arise, less obvious—but, I believe, just as important—is the notion that people or groups can "care too much" and that this too can be harmful. This is the equivalent to "pulling too hard" in my analogy because the group taking such a superproprietary interest will invariably act to the detriment of the other stakeholders. If, for example, the editor or someone else up the chain of command comes to see it as "his or her journal," others will lose interest if they feel their needs are not being served. Useful debate will shift elsewhere, and *APJ* will lose respect and support. (It is important to note here that a belief that certain opinions are being promoted or suppressed can be as much a matter of perception as reality. I am dismayed, but no longer surprised, at accusations that we would refuse to publish people or opinions based on anything other than the quality of their ideas and arguments.) Like Caesar's wife, *APJ* strives to be above reproach, but reputation is a fragile thing—easy to damage, slow to mend, and it can only be protected one day at a time.

So what does this mean? As a soon-to-be outsider, let me suggest some "checkpoints" I will look for—and you may wish to as well—in assessing the future course of this journal:

- *Balance.* Look especially at the opinion pieces and letters to the editor. Does *APJ* publish opposing views on issues? (I'll let you in on an ugly little secret: published letters to the editor represent a small but very complete sampling; we get so few that during my tenure, we have published virtually every one we have received!)

- *Relevance.* Keep in mind that *APJ* can only cover so much so fast, but if none of the concerns or debates in the headquarters and command centers on the flight line, or in the hangars or offices seems to resemble what's in *APJ*, it's a bad sign.

- *Participation.* Do generals contribute? Do captains? Also look for the big names (Holley, Mets, Warden, etc.) and the young guns (such as the Eaker Essay winners). Their continued contributions are an endorsement worth noting.

- *Visibility.* Do you see copies of *APJ* in the work areas? Do people know it's online? Are staffers *and* PME students referring to recent articles? Does an extract make the *Early Bird* now and then?

- *Innovation. APJ* is a comparatively young professional military journal supporting a service that prizes flexibility and innovation. *APJ* will certainly adapt and hopefully prosper as information technology presents new opportunities. Although a caution about change simply for the sake of change is in order, I will nevertheless be looking for fresh ideas and continued improvements in both *APJ*'s content and means of transmission.

It's important to remember that each edition is the result of a dynamic process, subject to influences both internal and external to the service as well as an ever-changing cast of principal players. Like golf, it's not a game of perfect. Readers should take the long view and look for the trends.

Just as I did not want to end my tour with a false note of optimism, so do I not wish to make an exit sounding like Chicken Little—the sky is no more falling than it is nailed in place. A *little* healthy doubt about this publication's future may even be a good thing if it

leads each of us to pay a little more attention to our professional journal. Right now, I think the jury is still out as to what kind of journal the stakeholders are willing to support. Over the long run, however, I have no doubt that we will get the journal we deserve.

Maj Pete Osika, USAF
Senior Editor, *APJ*
Maxwell AFB, Alabama

GOING DOWNTOWN

The article "Don't Go Downtown without Us: The Role of Aerospace Power in Joint Urban Operations" by Lt Gen Norton A. Schwartz and Col Robert B. Stephan (Spring 2000) is based on some very optimistic assumptions. The authors' conception of future urban operations is that such operations will be similar to past actions, such as those over Belgrade and Baghdad. These actions greatly resemble conventional air warfare against fixed targets in relatively industrial nations, without participation by ground forces.

Other military commentators hold a different view of future urban actions. Their view of future warfare in cities anticipates actions in Third World "nations" with heavy involvement by American ground troops. In this scenario, it will be difficult to distinguish friends from foes from neutrals. Confusion will reign. Enemy forces will not be intimidated by US aircraft flying overhead. Bombing from 10,000 feet, even with precision weapons, will have little or no impact on the outcome of the action. The enemy will use asymmetric means to counter American aerospace power, including concealment among the population, constant movement, and portable ground-to-air weapons. This environment will be lethal to low-flying aircraft, especially helicopters. Tactical insertion of troops by helicopters or V-22 aircraft will be hazardous at best. Such actions will more resemble the American experience in Mogadishu than that in Belgrade.

Schwartz and Stephan have a vision of aerospace power attacking key "adversary nodes" in the urban environment with precision weapons. Unfortunately, mobs such as those encountered in Somalia will have few, if any, such key targets or centers of gravity. What critical targets would aerospace power have attacked in Somalia? The offensive capabilities of aerospace power will be ineffective in many urban situations, short of an all-out leveling of urban areas similar to that performed by the Russians in Chechnya. Such operations by US forces would obviously be politically unacceptable.

It is true that all previous actions in metropolitan areas have not been the same as those experienced in Mogadishu. However, an urban concept of operations that ignores the American experience in Somalia is unrealistic.

Aerospace power will be a part of the joint team in urban operations. The combat impact of such power on many future actions in Third World cities may be minimal.

Robert R. Colot Jr.
Gloucester, New Jersey

AGAIN, JOINT URBAN FIGHT MEANS AEROSPACE TOO

In "Don't Go Downtown without Us," Lt Gen Norton Schwartz and I champion the idea that aerospace power has many valuable applications in the urban operational environment across the conflict spectrum. Mr. Robert Colot Jr.'s conclusion in his letter to the editor (see above) that our conception of future urban operations takes place exclusively in aerospace-power-intense environments such as we encountered in Operations Desert Storm and Allied Force is completely inaccurate. Although the "Baghdad" and "Belgrade" examples may well repeat themselves in future conflict scenarios, the armed forces of the United States must be prepared to engage in urban operations across the spectrum, from humanitarian relief and peace-support operations to major theater war.

In so doing, we continue to emphasize the fact that aerospace systems and capabilities may offer solutions to many of the unique

challenges faced by the joint force commander in the urban operational environment. This is just as true in operations such as Allied Force, in which aerospace power was the predominant instrument of power employed, as it is in other scenarios in which aerospace power may act in support of ground forces engaged in urban combat. Our basic argument, simply restated, is that aerospace power—through precision strike; overhead command and control; overhead intelligence, surveillance, and reconnaissance; and rapid mobility—may help the joint force achieve its objectives better and more efficiently, while minimizing risk to forces committed in this most challenging of all operating environments.

On a final note, I would like Mr. Colot to know that I had the US experience in Somalia foremost in mind in "Don't Go Downtown without Us." I served as operations officer for an Air Force special tactics unit whose combat controllers and pararescuemen were chopped to support Task Force Ranger during the "Bloody Sunday" operation in Mogadishu. From the experiences related by these fine airmen and the ground-force commanders they supported on 3–4 October 1993, I must emphasize that aerospace power—in the form of four light attack-helicopters—truly saved the day after the operation turned sour. Everyone should clearly understand that, had it not been for the continuous and deadly accurate fire support provided by these overhead assets, the entire engaged ground force would have been completely overwhelmed and overrun by Somali militia. This would have amounted to the greatest American military debacle since Custer's Last Stand. In fact, had additional aerospace power—in the form of the AC-130 gunship's optical sensors and precision-strike capabilities—been available to the ground-force commander that fateful day, I would argue that American casualties would have been dramatically reduced during the Task Force Ranger search-and-rescue and extraction operation. In response to Mr. Colot's query, enemy roadblocks, traffic choke points, sniper positions,

and militia assembly areas affecting ground-force survival and relief convoy operations represent "critical targets" that could have been decisively engaged by the AC-130 that day.

In summation, the urban "fight" is, first and foremost, a joint fight. Recent operations in and over Somalia, Panama, Liberia, Albania, Bosnia, Iraq, and Serbia all point to this fact. Aerospace power has served the joint force and the nation extremely well in all these examples. To ignore this fact is an invitation to revisit the carnage of Stalingrad, Hue City, and Mogadishu in future urban operations.

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Col Robert Stephan, USAF
Fort Lesley J. McNair, Washington, D.C.

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SEPARATISM AND THE SEA OF SPACE

Let me start by saying that I am not a rabid "United States Space Force (USSF) Now!" zealot. I'm also not dead set against it. In any case, I don't think that Ralph Millsap and Dr. D. B. Posey's article "Organizational Options for the Future Aerospace Force" (Summer 2000) advanced the argument for or against. The authors' "facts" are opinions—narrow, not very imaginative, and circular!

I chortled at reading that "the US military mission in space has not sufficiently evolved to warrant the establishment of a separate military service for space operations" (48). I'm sure that many Army officers made similar statements about Gen Billy Mitchell's efforts! One of the points made by those people in favor of a separate Space Force is that it won't evolve until it is released from today's "integrated aerospace force" fetters. The authors use the fact that space is an immature war-fighting arena as an argument for not giving it the freedom to mature. How clever!

Also, why do all four of their options assume that the Air Force is exclusively the progenitor of a USSF? Let's see . . . which service has more than two hundred years of experience in spending long periods isolated in man-made vessels in an inhospitable environ-

ment whilst voyaging or patrolling between (uncertain) points of call? Or in operating, provisioning, building, supporting, acquiring, and crewing vessels?

Finally, I question the idea that "'the environmental differences between air and space do not separate the employment of aerospace power within them'" (48). Really? My training, education, and experience in the 4th Space Operations Squadron tell me they do. Might not the sea be a more analogous operational medium?

Capt Mark M. Van Voorhis, USAF
Wright-Patterson AFB, Ohio

WAR ISN'T JUST KILLING

I enjoyed your editorial "Casualty-Aversion Doctrine?" (Summer 2000) because it is a subject that has interested and intrigued me for many years. Not only has technology markedly decreased wartime casualties, but also advances in preventive and curative medicine and dentistry have reduced casualties tremendously.

But I am writing to take issue with one comment that you make: "lest we forget that the business of war is still killing" (page 2). I

can't agree; killing is (as yet) one means to decide the outcome of battles and wars. But the business of war is (or should be) to reach a desired end state (for the United States, that's frequently the quintessential "better state of peace"). Therein, only the military instrument of national power deals in direct killing. And when the military instrument is used, as Sun Tzu admonishes military commanders, "Generally in war, the best policy is to take a state intact; to ruin it is inferior to this. . . . To capture the enemy's army is better than to destroy it. . . . For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill."

We should continue to exploit the promise of technology and the lessons of history to organize, train, and equip so we may "subdue the enemy without fighting"; we have that option and must, as an advancing civilization, exploit it in the name of humanity. But we must also continue to develop appropriate, contemporary aerospace doctrine that is not casualty-averse; to do otherwise is to be rendered impotent through doctrinal paralysis.

Lt Col Michael P. Holway, USAF
Maxwell AFB, Alabama

Three hours' plundering is the shortest rule of war. The soldier must have something for all his toil and trouble.

—Johann Tilly Sack of Magdeburg, 20 May 1631

Net Assessment

Only the dead have seen the end of war.

—Plato, 347 B.C.

Morals under the Gun: The Cardinal Virtues, Military Ethics, and American Society by Dr. James H. Toner. University Press of Kentucky (http://www.uky.edu/UniversityPress), 663 South Limestone Street, Lexington, Kentucky 40508-4008, 2000, 215 pages, $29.95.

Ethics isn't for sissies. It requires not only mental effort to cogitate the concepts but also the character of conviction to act upon them. As Dr. Jim Toner argues in *Morals under the Gun,* "Ethics is owing." That message is his paramount motive behind this new book—to spur readers on to moral, ethical works. Living up to his reputation as a leading military ethicist (and part-time baseball coach), once again Toner has hit a home run in the field of military ethics. This book demands more than one read, and it should become a seminal work in ethics studies.

Like the "weeping prophet" Jeremiah, Toner sounds an alarm by declaring that ethics is in real trouble, having come under the gun of socially driven relativism and its effects on social mores, religion, and military service. Regardless of the reader's profession, this uncompromising indictment of our time hits home, providing a pragmatic approach to a deep philosophical subject and going beyond mere academic contemplation to the realpolitik of everyday life. We all can, and should, do a little more thinking about why we act the way we do as we maintain our pace on the hamster wheel. Toner provides insight.

Because his initial approach is rather Machiavellian—although more in method than in message—some unsettled readers may toss the book early without realizing that the errant pitch is intended for effect. Toner certainly invites potential misunderstanding or risks having quotes taken out of context by cursory researchers. Indeed, liberal academics may think they have struck gold, not knowing it is but pyrite. But Toner is willing to take that chance to obtain his ends.

The *Uniform Code of Military Justice* is not enough. Neither is democracy. Our legalistic society (and military) is steeped in regulations and values, but often they are motivated by greed or profit rather than morality. The moral bedrock lies in four cardinal virtues: prudence, justice, courage, and temperance. Toner argues that these virtues are not just for head knowledge but for daily practice. He endorses "ethical fitness," and his effective use of historical case studies helps bridge the gap between intellectual concepts of virtues and their pragmatic application.

Morals under the Gun explores the cognitive and affective domains between deontological (ruled-based) ethics and teleological (ends-/outcome-based) ethics to advocate "virtue" ethics, which in essence means becoming someone of character—a "nice person rather than a bum." That certainly applies to the military.

Well researched and documented, this book provides commonsensical ethical philosophy in a time when ethics is largely uncommon sense. It is a must read for professionals who want to help connect brain, heart, and spirit.

Lt Col Eric Ash, USAF
Maxwell AFB, Alabama

Reorganizing the Joint Chiefs of Staff: The Goldwater-Nichols Act of 1986 by Gordon Nathaniel Lederman. Greenwood Press (http://www.greenwood.com), 88 Post Road West, Westport, Connecticut 06881, 1999, 232 pages, $59.95.

Graduate school, Squadron Officer School, Air Command and Staff College, the boss, the wife, the kids—for cryin' out loud, who has time to read another book, especially one as nebulous and abstract as *Reorganizing the Joint Chiefs of Staff?* Although this topic at first appears to be a tad esoteric at best, it is in fact one of the most profoundly relevant subjects that any US military officer could investigate. The organization of the Joint Chiefs of Staff (JCS), the development of the unified command structure, and the "joint versus service-specific debate" in general have literally given us the structure that provides form to the US military and

defense community. To understand the JCS, its place in the US defense community, and the debate surrounding how it got there is to go a long way toward understanding the design and implementation of US defense policy on both the strategic and tactical levels. Thus, no topic is more germane to US military officers of any service.

Lederman begins his work with a history of the JCS and its function over the last 50 years with a balance of detail that doesn't bog the reader down in irrelevant minutiae. He then proceeds to set the historical context of the question at hand (i.e., the reorganization of the JCS) by examining three basic tensions inherent in any military organization.

First is the tension between centralization and decentralization. On the one hand, "in centralized organizations, the apex of the hierarchy retains control of major decisions and insists on receiving detailed information from the hierarchy's base." Decentralization, on the other hand, "allows lower level officers the freedom to exploit opportunities without awaiting the hierarchy's cumbersome decision-making process." Lederman acknowledges this as a permanent tension and contends that no permanent and perfect balance exists. Second, "military organizations face the choice between geographic and functional delineations of responsibilities." Geographic divisions allow for focus and detail but are less efficient as duplicative sets of military units are built for each area. Functional divisions allow for economies of scale but tend to blur the focus and detail required for an understanding of individual countries and regions. Third is the specialist-versus-generalist perspective. Current high-tech systems and varying operational environments require personnel to undergo a great deal of education and training if they are to utilize them fully. Time spent focusing on one's "core skill" may adversely affect the appreciation of a more holistic approach. In the US military, these tensions have given rise to the pluralist model of organization in which representatives of the group provide differing perspectives on the tensions to a central authority, much like the division of power in the US political system. From there, Lederman discusses key points of the joint-versus-specific debate, as well as the JCS from World War II through current issues.

Lederman has done a fine job of presenting the material in an interesting and objective manner. He treats both sides of the continuing "joint-specific" debate fairly, without mistreating either one—something not easy to achieve. For this, Lederman is to be commended.

The book is very well documented and organized. In fact, the bibliography is worth the price of the book for any military officer serious about his or her professional development. It includes subjects such as "Military Theory and Organizational Behavior," "American Peace-Enforcement Deployments: Haiti, Rwanda, Somalia, Balkans, etc.," and "Air Power—Including the Gulf Air Campaign and the Kosovo Conflict," among others.

Like all of us, from college to grad school to continuing professional development, I have read a lot of books. I would place *Reorganizing the Joint Chiefs of Staff* close to the top of the list. It deals with a subject inherently germane to every military officer, no matter the service. Further, it treats a complex topic with fairness and succinctness, and provides a bibliography well suited to further investigation.

If you are a professional military officer, you owe it to yourself, your service, and your country to become familiar with the subjects covered in this book. So, in your scant minutes of freedom, sandwiched between the requirements of graduate school, SOS, ACSC, the boss, the wife, and the kids, take a little time to acquaint yourself with Mr. Lederman's work. It's worth the time.

Capt Brett Mers, USAF
Whiteman AFB, Missouri

Strategy, Air Strike and Small Nations by Shaun Clarke. Air Power Studies Centre (http://www.defence.gov.au/aerospacecentre), RAAF Base, Fairbairn ACT 2600, Australia, 1999, 204 pages (softbound).

This is one of the freshest and most original books on airpower theory I have read in some time. Wing Comdr Shaun Clarke, a Royal New Zealand air force officer, is an unusually clear-thinking, insightful, and gifted writer. Most of what is written today concerning airpower comes from the pens of "large nation" airmen. Clarke questions whether such writings are applicable to the air arms of the world's 129 "small nations" that possess an air-strike capability. He therefore sets about examining the issue of strategic air attack and its relevance to a New Zealand–Australian alliance that possesses 150 strike aircraft. The results of his inquiry are important.

The air arms of small nations tend to emphasize the support of ground forces. This is due to the traditional dominance of defense establishments by armies; the "junior partner" status of small nations

involved in coalitions; the high cost of quality air arms, which reduces their number and gives them less clout than their more numerous surface brethren; and the belief that strategic air attack requires mass—an attribute unobtainable by small nations. Only the last item can claim any sort of logical legitimacy—tradition is hardly a worthy criterion for a defense force structure. In the past decade, the emergence of highly effective and inexpensive precision-guided munitions (PGM) has demolished the barrier of mass. Precision weapons make aircraft exponentially more effective than they used to be—small nations can now "punch above their weight." As a consequence, these air forces, despite their size, can now play a far greater role and thus obtain better status at the defense table.

If PGMs make strategic air strikes feasible for small nations, then the next question concerns what the primary targets should be. After a good discussion of various targeting theories, Clarke focuses on the enemy's leadership as the key center of gravity in a state: it must be induced to modify its behavior and accede to the attacker's wishes. He coins a term, "SPOT [strategic persuasion oriented targeting] bombing," that employs a detailed intelligence assessment of an adversary and that utilizes PGMs to produce the maximum effect on the enemy leadership. Of importance, unlike the guidance of US Air Force doctrine, a high tempo for these air attacks is not necessary—indeed, it is problematic for a small nation. The author concludes with the caveat that SPOT bombing will almost certainly become part of a larger package of military, economic, and political levers designed to influence an adversary. Airpower cannot do it alone.

This is an interesting proposal, but Clarke is too modest. His basic goal—to use precision airpower, discreetly directed at high-value targets, to ensure maximum political impact—is valid for large nations as well as small ones. Indeed, one would hope that the United States would follow a similar formula, despite its bounteous air assets. One concern, however, is Clarke's emphasis on leadership targeting, which parallels the recent theories of John Boyd and John Warden. Both of them turned away from the economic-based targeting models of earlier air strategists and focused instead on the enemy leaders. In essence, Boyd sought to confuse the enemy leaders while Warden sought to eliminate, overthrow, or at least isolate them from their military forces and people. Clarke follows this trend. The problem with the leadership-targeting model is that precious little empirical evidence exists to show how or even if such a targeting strategy will work.

Theoretically, the concept is logical, almost commonsensical, but one finds few instances in history when a leadership change has led to a change of policy benefiting the attacker. Usually, political behavior does not change when a leader falls—as was the case with Tsar Nicholas, Emperor Franz Joseph, Neville Chamberlain, Hideki Tojo, and Ho Chi Minh. In some cases—France in 1871 or Somalia in 1993—the "leaders" do not have sufficient control over the people to effect a change of policy. If, on the other hand, Clarke's intent is merely to influence incumbent leaders and not replace them, the method of how, exactly, one does so is not obvious. Air strategists thus return to the same problem they began with: determining which targets will have the maximum impact on the enemy.

It may be unfair to cast stones at Clarke over this issue. His basic theme is an inherently useful and important one. Small nations have limited resources with which to gain their ends. Every shot must count; therefore, it is absolutely imperative that their air planners focus, define, and prioritize. Precision attack by air now offers substantial opportunities for the small powers because it combines low risk with low cost to achieve large results. Clarke offers a useful first step for air planners to think through—specifically, how to achieve this formula.

Strategy, Air Strike and Small Nations is fascinating reading for all planners, strategists, and airmen. For Americans, grappling with the problems of small nations and understanding how they—whether allies or adversaries—address issues of air warfare is a very rewarding process. To obtain a copy of this excellent book, contact the Aerospace Centre (formerly the Air Power Studies Centre) in Canberra, Australia, E-mail: apsc@dynamite.com.au, or the RNZAF Air Power Development Centre in Auckland, E-mail: shaun.clark@nzdf.mil.nz.

Col Phillip S. Meilinger, USAF
Tysons Corners, Virginia

The Kinder, Gentler Military: Can America's Gender-Neutral Fighting Force Still Win Wars? by Stephanie Gutmann. Scribner (http://www.mlr.com/scribner/index.html), The Gale Group, P.O. Box 9187, Farmington Hills, Michigan 48333-9187, 2000, 300 pages, $25.00.

The Kinder, Gentler Military is a scathing critique of policies that, according to the author, have created a military force perhaps incapable of protecting the very society to whose standards it must ad-

here. The author implies that her problem lies not with the women currently serving in the military or with those who have already served. Instead, efforts to create a gender-neutral environment have led to a fatal loosening of standards. Her book makes some very good points and has some well-researched sections. However, her overall disregard for many important aspects of a modern military and her choice of subject-matter experts make some parts of the book almost laughable. She defines readiness as simply a measure of morale. One would be hard pressed to find a real military expert who would define readiness in such a limited manner. The book, while purporting to be a critique of the military, is really a critique of the Army, with some attention paid to the integration of women aboard Navy ships. It seldom mentions either the Air Force or Marine Corps.

Gutmann's self-professed "military illiteracy" pervades the book. She often mocks terms and situations she does not understand, thinking them another example of succumbing to political correctness. This serves only to lessen her credibility and weaken her argument. For example, while recounting her visit to Army basic training, she mocks the term *reception* (the in-processing that begins the first day). Had she been "militarily literate," she would have known that *reception* is a logistical term (ask any logistician about reception, staging, onward movement, and integration [RSO&I]) rather than a "gentler" term referring to a social gathering.

Gutmann should have spent some time trying to learn about military operations and force employment. Her ignorance in this area is stunning. For example, many of her references to commanders are drawn from the movies. In fact, the book cites more movies than it does books on the military. She even speaks of today's generals moving little pieces around a big map board, à la World War II movies.

One of her accounts of morale-readiness problems takes place on several wasted pages where she describes the whines of sailors aboard the USS *Stennis*—their chief complaint is that they aren't having fun. Similarly, regarding the port call in Bahrain, the sailors are upset over curfews. Somehow, she is able to reconcile this with her earlier contention that men join the military because they crave discipline. Therefore, we are left to assume that discipline is fine as long as it doesn't interfere with having fun. She also tells us of soldiers prohibited from drinking aboard ship or buying a *Playboy* magazine. One wonders if the fact that she is a contributing writer to *Playboy* has anything to do with her relating this huge, morale-killing complaint.

She does, however, do a good job of recounting events she feels have contributed to the military's current gender-integrated culture. We see this in her handling of the Aberdeen and Tailhook scandals, for example. Exhaustively researched, well written, and backed up by documented evidence, this section is also the easiest one in the book to read. She would have done well to have concentrated all of her efforts here.

Perhaps the greatest detriment to her argument and credibility is her "subject-matter experts"—sometimes named, sometimes anonymous, usually company-grade officers, and often lieutenants. She does express her regret that many of her sources wished to remain unnamed, fearing that their comments would negatively affect their careers.

Overall, the book makes some interesting points. One should note that this is a people-issues/human-relations book—the heart of her argument, after all, is that readiness is all about how people feel. This is perhaps what is most troubling about both the policies she detests and her argument. There are many factors to be considered besides the warmth and fuzziness of being together. Bonding and teamwork are important, and they still take place very often, in spite of—or sometimes due to—the policies in effect.

Capt Natalie S. Russell, USAF
Maxwell AFB, Alabama

Germany's Last Mission to Japan: The Failed Voyage of U-234 by Joseph Mark Scalia. Naval Institute Press (http://www.nip.org), 291 Wood Road, Annapolis, Maryland 21402, 2000, 250 pages, $29.95.

This book tells the remarkable account of U-234, a German submarine carrying German experts, Japanese officers, and German experimental technology, that ran the Allied blockade and surrendered on 15 May 1945. Germany and Japan decided to exchange technology and war material because Japan lost its overland link to Germany when the latter attacked the Soviet Union. At first the two allies used blockade-running ships, but that became too dangerous. So by 1943, Germany started sending material and specialists to Japan in U-boats to avoid the blockade.

U-234, a minelaying U-boat, left Germany on 5 April 1945, her mine-storage areas full of material for Japan. The 12 passengers included the new air attaché to Tokyo, General of the Air Force Ulrich Kessler, who had directed the air attack on Poland in 1935 and was implicated in a plot against Hitler in 1944. Accompanying the general were two military advisors—1st Lt Erich Menzel, a radar specialist, and Lt Col Fritz von Sandrart, an expert in antiaircraft defense strategy. Gerhard Falcke, a naval construction expert with diplomatic experience, headed the naval contingent. Heinrich Hellendorn, a naval antiaircraft specialist, was studying the Imperial Navy's tactics at sea. Richard Bulla, a naval aviator, had been sent to observe Japanese carrierborne naval aviation. Naval judge Kay Nieschiling was to be the judicial officer in charge of military justice for the two thousand German naval personnel in Japan. Dr. Heinz Schlicke, one of Germany's leading electronics experts, was to help Japan develop new radar and countermeasures systems. August Bringewald, who headed a two-man Messerschmitt contingent, was in charge of ME-262 jet-fighter production. Franz Ruf, an industrial machinery specialist, was to help the Japanese build new aircraft factories. Also on board were two Japanese officers, Lt Comdr Tomonaga Hideo, a naval aviator and submarine specialist, and Lt Shoji Genzo. The mission of these men, both of whom had served as attachés at several Japanese embassies in Europe, was to make sure the material arrived in Japan.

In May, Lt Comdr Heinrich Feller received a message telling him to surrender his boat because the war with Germany was over. Based on the location of U-234, he should have surrendered to the Canadian navy, but he was very close to the American surrender area. Thus began Feller's dilemma—where would he go and to whom would he surrender? The passengers and officers offered their suggestions, ranging from going to Argentina or Uruguay or even an island in the South Pacific. Because Feller and his officers decided they should avoid the British and Canadians, fearing they would turn them over to the French, the crew began the cat-and-mouse game of avoiding the Canadian navy and trying to reach the Americans to surrender to them.

The Americans did in fact capture the boat and took it to Portsmouth, New Hampshire. Because of the personnel on board, U-234 was a fine prize; however, the Japanese officers, fearful of how the Americans would treat them, committed suicide with sleeping pills before capture. The Office of Naval Intelligence (ONI) interrogated the personnel on board to find out the state of Japanese weaponry and how much German experimental weaponry had found its way to Japan. ONI also found a treasure trove in the storage compartments of the U-boat: complete drawings and prints for the V-1 and V-2 rockets, a complete, disassembled ME-262 jet fighter, an ME-163 rocket-propelled fighter, and disassembled jet engines. More mysterious was the 1,235 pounds of uranium oxide, which would give U-234 notoriety as historians and scientists tried to figure out what the Japanese planned to do with this compound.

Germany's Last Mission to Japan is a well-researched and documented book detailing the information and technology that U-234 brought to America. Anyone interested in how America acquired Germany's advanced technology should read this fascinating tale.

Capt Sheila-Llyn Van Nederveen, USAFR
Maxwell AFB, Alabama

America's Space Sentinels: DSP Satellites and National Security by Jeffrey T. Richelson. University Press of Kansas (http://www.kansaspress.ku.edu), 2501 West 15th Street, Lawrence, Kansas 66049-3905, 1999, 329 pages, $35.00.

Jeffrey T. Richelson, a senior fellow with the National Security Archive, has written several books on the American intelligence community and its means of data collection. His latest work, *America's Space Sentinels*, provides informative insight into the development and use of infrared (IR) satellite platforms and the lasting impact they continue to have on American national security. Readers who add this book to their personal libraries will find the more than 50 pages of endnotes and three appendices of data on the Defense Support Program (DSP) an invaluable baseline for further research on space-related topics. I was impressed that the author's style of writing effectively weaved history, geopolitics, and technical jargon in such a way that this work will appeal not only to people in the space and intelligence career fields but also to a cross section of operators, strategists, and engineers.

This book includes three distinct sections. Chapters one through five present the issues surrounding the deployment of DSP satellites and the vindication of the program's proponents. Chapters six through 10 cover the technical evolution and

utilization of DSP satellites in response to changes in the geostrategic environment. Chapters 11 through 13 address the debate over DSP's potential successors. The author concludes the final section by presenting the future missions of DSP's replacement: the Space-Based Infrared System (SBIRS).

Richelson opens the book with the genesis of the cold war and the wealth of V-2 rocket data procured by the US Army from the German missile and research facility at Peenemünde, Germany. He then shifts gears to the post-sputnik debate over the viability of space-based early warning satellites as a more effective means of covering the emerging Soviet ICBM threat than ground-based radars. His focus then moves to the whirlwind of operational tests, congressional debate, contractor issues, and friction among senior defense leaders over the potential deployment of DSP's predecessor, the Missile Defense Alarm System. What makes this third chapter interesting are the parallels that one can draw to the recent controversy surrounding the proposed deployment of a national missile defense. The ensuing chapters cover events leading to the operational deployment of the DSP constellation and the stumbling blocks encountered along the way to meeting that realization.

The second section of the book addresses upgrades made to DSP satellite sensors over the years to accommodate changes in American doctrine and nuclear war-fighting strategies. Accompanying these shifts in doctrine was interservice rivalry over the dissemination of data on tactical events detected by DSP satellites. Richelson summarizes the Air Force's noncooperation as "due more to fear of compromising the primary DSP mission of warning of strategic attack than to reluctance to share a key Air Force asset with a rival service" (p. 105). Chapter 10 is devoted to the use of DSP satellite data to support allied operations during Operation Desert Storm. This chapter illustrates how DSP data was used to expeditiously pinpoint Iraqi launch locations, enabling quicker counterstrikes by allied forces. It also explains how DSP satellite detection of incoming Scud missiles was used to cue Patriot missile batteries. Ironically, this successful use of DSP satellite data during the Gulf War "made it a target for criticism as part of the debate over the need for a new system" (p. 175).

The initial chapters of the book's final section address the interservice and interagency turf battles that stemmed from indecision over the appropriate technology to replace DSP satellites. The myriad of Air Force Space Command and US Space Command documents gained from Richelson's Freedom of Information Act requests provides readers with a front-row seat to the clash of personalities among those who staunchly defended DSP and those who believed its performance during the Gulf War to be a fluke—thereby necessitating its replacement. As readers would expect, the final chapter talks about what the SBIRS program is and how it will continue to support DSP early warning missions, albeit in a radically different geostrategic environment, where the focus has shifted from strategic warning to counterproliferation, theater-specific issues, and treaty verification.

America's Space Sentinels is the only book to exclusively cover the employment of DSP satellites since Desmond Ball's *A Base for Debate: The U.S. Satellite Station at Nurrungar,* published in 1987. Richelson's work has provided us with a detailed history of the employment of DSP satellites; more importantly, he has told the story of their successful utilization since the end of the cold war. This book is a must read for people who desire to intelligently discuss the issues that surround the employment and utilization of space-based IR sensors. Kudos to the University Press of Kansas and Mr. Richelson for sharing it with the rest of us.

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

The New Terror: Facing the Threat of Biological and Chemical Weapons edited by Sidney D. Drell, Abraham D. Sofaer, and George D. Wilson. Hoover Institution Press (http://www-hoover.stanford.edu/presswebsite/hoover-press2.html), Stanford University, Stanford, California 94305-6010, 1999, 511 pages, $24.00.

New books covering the subject of biological and chemical weapons (BCW) are now coming out weekly. Although most of them rehash the subject in a different format or sensationalize the horrifying potential of these weapons, this work is fundamentally different. It provides new information not found in other works. A must read for the soldier, statesman, first responder, or others concerned with the implications of these weapons in the future, *The New Terror* includes valuable insights about complicated issues surrounding BCW and can easily serve as a textbook.

The book is a compilation of topics covered during the Hoover Institution's National Security

Forum of 1998. The 17 articles cover six key areas: dimensions of the biological warfare problem, the role of intelligence, building and implementing BCW control regimes and the regulation of BCW, legal constraints, preparing for BCW attacks, and deterring the use of BCW. The contributors are noted experts in this field, such as Rolf Ekéus (executive chairman of the United Nations Special Commission [UNSCOM]), Jonathan B. Tucker (research professor and director of the Chemical and Biological Weapons Nonproliferation Project at the Center for Nonproliferation Studies of the Monterey Institute of International Studies), and Michael Moodie (president of the Chemical and Biological Arms Control Institute).

The first section provides a comprehensive analysis of the technical issues that make chemical weapons a viable threat in the future. It also includes an excellent chapter that projects the evolution of biological weapons made possible by biotechnological advances. The section concludes with an average discussion of potential BCW attack scenarios. All three chapters provide the reader with an excellent background in BCW threat assessment.

The intelligence section presents the reader with a breakdown of the myriad challenges that the spread of these weapons and their potential use by nonstate actors force upon the American intelligence community. The section on BCW control regimes contains a long chapter by Jonathan Tucker that describes in rich detail the evolution of international norms regarding BCW. The commentary on page 255 runs contrary to several of his conclusions and must be read to fully appreciate Tucker's contribution. Chapters on the history of the Biological Weapons Convention protocol and the UNSCOM experience in Iraq highlight the difficulties of developing enforceable international safeguards against the proliferation of BCW.

The fourth section discusses the legal issues that permeate effective implementation of international agreements on BCW in the United States. The fifth section, regarding domestic preparedness, may be the weakest section since so much activity has occurred on this front since 1998. Ironically, it may also be the most thought provoking since so much work remains to be done to deal with the issues posed by the chapters in this section.

Discussions on deterrence dominate the final section. Ultimately, success against BCW in the future may depend most on deterring attacks rather than preventing the spread of these weapons, re-

sponding to their use, or containing the consequences of an event. Thus, the analysis contained in this section is extremely useful for framing policy debates on the appropriate American responses to the potential of BCW.

The New Terror is wonderfully organized, and the writing is, for the most part, lucid and informative. The major weakness of this work is the fact that it is based on presentations almost two years old. Events and attitudes since then have slightly altered some of the analysis in this work, but overall it is excellent. If we were to recommend a single volume on BCW that would familiarize a neophyte with the major issues or provide interesting insights for a seasoned scholar, this would be the one.

Col Jim Davis, PhD, USAF
Maxwell AFB, Alabama

Maj John Terino, USAF
Maxwell AFB, Alabama

The JG 26 War Diary, vol. 2 (1943–45) by Donald Caldwell. Grub Street (http://www.grubstreet.co.uk), The Basement, 10 Chivalry Road, London SW11 1HT, United Kingdom, 1996, 576 pages, $49.95.

With this book, a follow-up of his *JG 26: Top Guns of the Luftwaffe* (1991), Donald Caldwell has added another superb work on the Luftwaffe to the corpus of serious works on airpower history. In this volume, the author outlines the combat actions, victories, and losses of Germany's premier fighter wing on the Western Front. By following this micro view of history, Caldwell documents the decline and fall of the Luftwaffe against the Allied air forces during the height of the Allied bombing campaign against Germany.

The strength of the book lies in Caldwell's comprehensive approach to research. The Luftwaffe documents in the German Military Archives as well as the letters, log books, and personal diaries of *Jagdgeschwader* (JG) 26 personnel were thoroughly examined by the author. In addition, the author interviewed dozens of surviving members of JG 26. While getting a comprehensive picture of the air war from the German side, Caldwell also conducted exhaustive research in the US and British archives for hundreds of specific instances of air combat in order to verify victory/loss claims

and to carefully reconstruct the events of many of the aerial battles.

The author's technique is to link the actions of JG 26 with the operational-level air war. The primary Royal Air Force (RAF) and US bombing targets and air operations are briefly outlined on a daily basis to provide a context for JG 26's operations, which were primarily to defend Northern France, the Low Countries, and Northern Germany against Allied bombing raids. From there, the author provides an outline of JG 26's operations for each day of the war from 1943 to the surrender in 1945. Losses and victory claims are covered in great detail as well as some selected instances of fighter combat. In *The JG 26 War Diary* the reader can clearly see the slow decline of the Luftwaffe fighter force and the loss of German air superiority over Northern Europe. Although the Luftwaffe held on capably throughout the air battles of 1943, by early 1944 one sees the effect of attrition upon an elite fighter unit as the unit's experienced pilots are lost and replaced with men who have minimal flight training and who prove to be easy targets for the well-trained British and American pilots who are now escorting the bombers in overwhelming numbers. Yet, despite heavy attrition and numerous disasters—such as

the heavy losses from the ill-conceived Operation *Bodenplatte* on 1 January 1945—JG 26 remained a cohesive and capable combat unit right to the end of the war. Indeed, the last aerial victory of JG 26 came on 1 May 1945.

One especially valuable contribution of the book is its analysis of numerous small aerial battles. By examining Allied and German accounts of the same battles, the author demonstrates which tactics tended to work for both sides as well as the strong and weak points of the various aircraft models engaged in close combat.

The JG 26 War Diary should be required reading for any serious student of the air war over Europe in World War II. For the operational and tactical insights into the air war the book provides, it is certainly worth the price. Even the more casual reader of military history will find this to be a very useful addition to a personal military library. The several hundred photographs that the author uses to illustrate the book, mostly photos from unit members, make this book one of the best illustrated of the World War II aviation histories.

James S. Corum
Maxwell AFB, Alabama

He never rode off any field except as a victor. He quitted war invincible; and no sooner was his guiding hand withdrawn than disaster overtook the armies he had led.

—Winston Churchill on the Duke of Marlborough, 1933

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Rep. Ike Skelton (AB, LLB, University of Missouri) is serving his 12th term as Democratic congressman from Missouri's Fourth District. He is the ranking member of the House Armed Services Committee. Prior to his election to Congress, he served as prosecuting attorney for Lafayette County, Missouri; special assistant attorney general; and Missouri state senator. Elected to the 95th Congress on 2 November 1976, Representative Skelton has been reelected to each succeeding Congress.

Lt Col Paul C. Strickland (BA, California State University, Fullerton; MS, Embry-Riddle Aeronautical University; MMS, Marine Command and Staff College) is a student at the Air War College, Maxwell AFB, Alabama. He previously served as an instructor pilot in a variety of aircraft, including F-16s at Luke AFB, Arizona; Ramstein AB, Germany; and Aviano AB, Italy; in A-10s at RAF Bentwaters, United Kingdom; and in F-5s at Williams AFB, Arizona. He was also an F-16 aerial demonstration pilot at Nellis, AFB, Nevada, and chief of the Tactical Evaluation Branch, Fifth Allied Tactical Air Force (NATO), based in Italy.

Lt Col Lourdes A. Castillo (BS, University of Puerto Rico; MS, Troy State University) is deputy chief, Plant Management Division, Technology and Industrial Support Directorate, Ogden Air Logistics Center, Hill AFB, Utah. Previously, she served in supervisory maintenance positions at Nellis AFB, Nevada; Torrejon AB, Spain; Howard AFB, Panama; and Holloman AFB, New Mexico. She also served as F-16 functional manager on the Headquarters Air Combat Command logistics staff and as military secretariat for the Joint Staff's Directorate for Logistics. Colonel Castillo is a graduate of Squadron Officer School, US Army Command and General Staff College, and Air War College.

Lt Col Matthew B. Caffrey Jr., USAFR (BS, New Jersey Institute of Technology; MA, University of Alabama) is a professor of wargaming and campaign planning at Air Command and Staff College and is a lieutenant colonel in the Air Force Reserve, serving with the Air Staff's Checkmate organization. He is the coauthor of the *Gulf War Fact Book* and a frequent speaker at conferences related to wargaming.
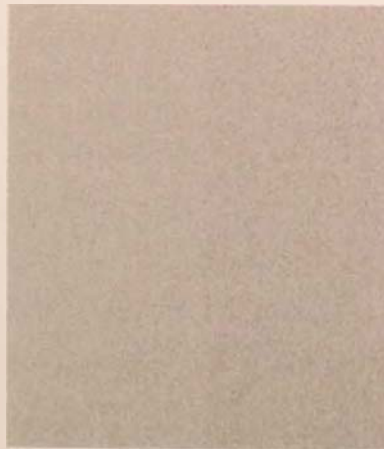
Dr. David R. Mets (BS, USNA; MA, Columbia University; PhD, University of Denver) is a professor at the School of Advanced Airpower Studies, Maxwell AFB, Alabama, and was once the editor of *Air University Review*. He spent a 30-year career as a Navy sailor and as an Air Force pilot and navigator. He flew more than nine hundred C-130B sorties in Vietnam, and his last flying tour was as commander of an overseas AC-130 squadron. He had teaching tours at both the US Military Academy and the US Air Force Academy. Dr. Mets has published four books.

Maj Brent J. Talbot (BA, MA, Brigham Young University) is deputy director of the USAF Institute for National Security Studies and assistant professor of political science at the US Air Force Academy, specializing in Middle East politics and US national security policy. A senior navigator, he has logged over fifteen hundred hours in the F-111 and T-43 aircraft. In 1997 he spent a year as chief of the Tactics and Doctrine Division, Air Component of the Combined Forces Command, Osan AB, Korea. A graduate of Squadron Officer School and Air Command and Staff College, Major Talbot is a PhD candidate at the University of Denver's Graduate School of International Studies.

2d Lt Jeffrey J. Hicks (USAFA) is a graduate student specializing in international security and economic policy at the Maryland School of Public Affairs, University of Maryland. Lieutenant Hicks has served as a summer-intern intelligence analyst with the US State Department.

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