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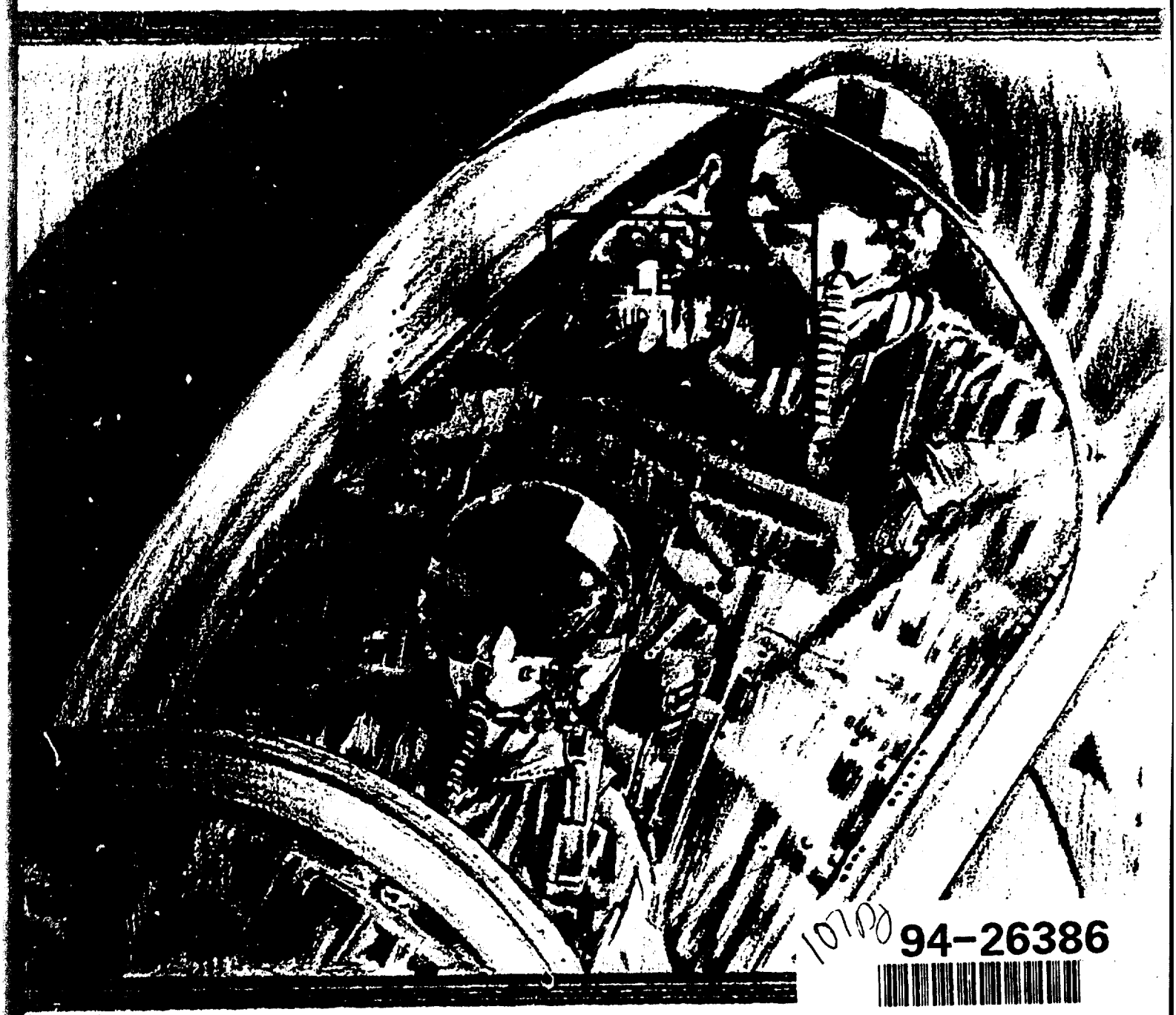
AIR POWER THEORY AND THE CONDUCT OF OPERATIONS DESERT SHIELD AND DESERT STORM



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Victory from Above
Air Power Theory and the Conduct of Operations Desert Shield and Desert Storm

by

JEROME V. MARTIN
Lt Col, USAF

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This publication has been reviewed by security and policy review authorities and is cleared for public release.

To my wife and my best friend,

Suzi

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Foreword

The US-led coalition response to Iraq's invasion of Kuwait was a highly successful application of modern military forces, especially air power. Both the buildup and the combat operations provide significant food for thought for military analysts and a considerable source of insight for future commanders. As with any military conflict, this war should not be viewed as a model for the next war, but rather as another contribution to the body of experience and knowledge that shapes the insights and perspectives of military professionals.

Some observers have contended that the performance of the coalition air forces in Operations Desert Shield and Desert Storm heralds the arrival of a new generation of warfare, sometimes labeled hyperwar. Others commenting on the experience note the merger of capabilities—technology focused by tactics and strategic planning—with the long-standing promise of air power theory. This study focuses on the latter perspective and the close relationship between the core elements of air power theory and the conduct of Operation Desert Shield and Operation Desert Storm.

Lt Col Jerome V. Martin wrote this study as a primer on air power and a broad survey of the Gulf conflict for the cadets at the US Air Force Academy. His summary of the essence of air power theory and its illustrated use against Iraq should help Air Force officers and others interested in air power to better understand the potential of modern aviation in a crisis situation and in combat.

ROBERT M. JOHNSTON, Colonel, USAF
Director, Airpower Research Institute

About the Author

Lt Col Jerome V. Martin

Lt Col Jerome V. Martin was born and raised in Valley City, North Dakota. He graduated from the United States Air Force Academy in 1972 with a Bachelor of Science degree and double majors in International Affairs and Latin American Studies. His first assignment after completing intelligence officer technical training was as the operational intelligence officer for the 481st and 524th Tactical Fighter Squadrons at Cannon Air Force Base (AFB), New Mexico. Colonel Martin then served as a country desk analyst for Cambodia in the headquarters of the United States Support Activities Group, Nakhon Phanom Royal Thai Air Base, Thailand. He next was a Warsaw Pact air analyst at Headquarters United States Air Forces Europe, Ramstein Air Base, Germany.

In 1978, Colonel Martin returned to the Air Force Academy as an instructor of military studies. During this tour, he participated in an extensive study of the professional education program at the Academy and helped develop the Professional Military Studies and Military Training Program that was implemented in 1980. He designed and served as the course director of two upper division courses on joint operations and on force analysis and the Soviet military. The Air Force Academy then sponsored his doctoral studies at Ohio State University. He earned a PhD in Military History with minor fields in National Security Policy and in Russian and Eastern European History. In 1985, he began his second assignment on the commandant's staff at the Air Force Academy, serving as chief of the Military Studies Division and earning the academic rank of tenure associate professor.

The Air Force Academy selected him to serve as a command-sponsored research fellow in 1991. During the 1991–92 academic year he was assigned to Airpower Research Institute (ARI), Maxwell AFB, Alabama, where he completed this study. During the year he also attended and graduated from Air War College.

Colonel Martin is currently the assistant deputy commandant for Military Instruction at the US Air Force Academy. He is married to the former Suzanne Ittzes of Hot Springs, South Dakota. They have two children, Eric and Kristina.

Acknowledgments

This research study was performed during a sabbatical from my academic and administrative responsibilities at the United States Air Force Academy. I owe a special thanks to Brig Gen Philip D. Caine, USAF retired, the former deputy commandant for military instruction, and Maj General Joseph Redden, the former commandant of cadets, for allowing me the opportunity to pursue this research project and to attend Air War College.

I also owe a great deal of gratitude to Suzi, my wife, and to Eric and Kristina, our children, for allowing me to uproot us all from our comfortable existence in Colorado for a one year trip to the deep South. Their support and encouragement, their willingness to accept the challenge of two moves in a year, and their acceptance of the time demands of my double duty as a researcher and a War College student, made a demanding situation tolerable. Their love and support were critical factors in my ability to complete this study.

Many people on Maxwell AFB provided invaluable support and assistance during my tour in Alabama. Within the Air University College of Aerospace Doctrine, Research, and Education (AUCADRE), I am deeply indebted to Preston Bryant, my editor, who struggled to make my periodically convoluted prose clear. I also very much appreciate the comradeship and positive encouragement I received from Lt Col Mike Kirtland, my office mate and sanity monitor. Lt Col Tom Nowak, the "mother hen" for all the command-sponsored research fellows, provided valuable help and direction in the process of producing a timely product. Several other individuals deserve great credit for encouraging me and helping to shape my work—Col Dennis Drew, the former director of ARI; Col Bryant Shaw, the acting director of ARI; and Dr David MacIsaac, my initial mentor in the program. I found many other supportive friends in the professional family of ARI. Many thanks to all of them.

I also benefitted greatly from the support and encouragement of many people in the Air War College. The other students in my two seminars helped make the year more fun and easier to survive. My Air War College advisor, Col Kent Harbaugh, deserves my special thanks for his insightful reviews and suggestions. I am also most appreciative of the interest, encouragement, and suggestions that I received from Col Jim Brechwald, Dr Sandy Cochran, and Dr Bill Snyder of the Air War College faculty.

All of the many people who encouraged and supported me deserve a significant amount of credit for the value of this study. I alone must take responsibility for any errors or shortcomings.

JEROME V. MARTIN, Lt Col, USAF
Research Fellow
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Introduction

Desert Shield and Desert Storm were remarkably successful military operations. As such, they will be studied for years by professional military officers and civilian analysts. These assessments will help define the way the next war will be fought, with the recognized caution that each and every war is indeed unique and that no combat situation exactly mirrors a previous battle, campaign, or war. The air and ground campaigns to liberate Kuwait are added sources of considerable fodder for thought and debate about the nature of modern warfare.

This study seeks to analyze a narrow portion of the Desert Shield–Desert Storm material with the objective of gaining increased understanding of the core elements of air power theory and of the basic employment concepts of modern air power. It follows a chronological pattern, beginning with surveys of air power theory and background information on the crisis. The Desert Shield phase, the planning of the air campaign, and the execution of the theater campaign for the liberation of Kuwait follows. Although this format provides a survey of military planning and operations, the central objective is to create an understanding of air power and its theoretical foundations.

The term "air power" is used in its broadest sense to describe the national military capability to operate in the third dimension. Since 1959, the USAF lexicon has described this as using the aerospace environment. Air operations exploit the inherent advantages of speed, range, and flexibility to concentrate firepower on specific targets or to perform other critical missions such as transport or reconnaissance. This broad definition incorporates the aerospace assets and capabilities of all of the armed services, national industrial design and production, and civil aviation.

Within this broad definition, the discussion of air power in this study focuses primarily on the USAF. This is not intended to slight the roles played by other services and by other nations in the Desert Storm coalition; it is, rather, a reflection of the narrower objective of the study. Additionally, the emphasis on air power and the United States Air Force found here does not challenge the reality that modern war is a joint activity and that air power is but one component of the military instrument. The objective of this work is to illuminate the air component and its conceptual foundation. This study is not a definitive history of the war or even of the war's aerial activities; it is a broad survey that uses selected examples to illustrate key concepts of air power theory and air operations.[1]

The study of air power, or any military topic, involves a special vocabulary with terms and phrases designed to communicate specific meanings. Unfortunately, many military terms often convey multiple meanings—and this can lead to confusion and miscommunication. To ensure clarity of meaning, this study uses the official US Department of Defense definitions of terms wherever possible.[2]

Operations Desert Shield and Desert Storm are important markers in the evolution of air power. Although the specific applicability of the lessons of these operations is being hotly debated, and will continue to be debated for a long time, the experiences themselves have considerable value as highly illustrative case studies of the

capabilities and limitations of aerospace power and the intellectual framework that shapes the application of this power. Gen John Michael Loh, the commander of the newly formed Air Combat Command, summed up the importance of the Gulf War by noting that the conflict "proved that air power has come of age" and demonstrated the "confluence of speed, range, lethality, precision, and flexibility fused in one champion—air power."[3]

Notes

1. For broad surveys of the war, see James Blackwell, *Thunder in the Desert: The Strategy and Tactics of the Persian Gulf War* (New York: Bantam Books, 1991); Norman Friedman, *Desert Victory: The War for Kuwait* (Annapolis, Md.: Naval Institute Press, 1991); Bruce W. Watson et al., *Military Lessons of the Gulf War* (Novato, Calif.: Presidio Press, 1993); *US News & World Report* Team, *Triumph Without Victory: The Unreported History of the Persian Gulf War* (New York: Times Books, 1992); James F. Dunnigan and Austin Bay, *From Shield to Storm: High-Tech Weapons, Military Strategy, and Coalition Warfare in the Persian Gulf* (New York: William Morrow and Co., Inc., 1992); Dilip Hiro, *Desert Shield to Desert Storm: The Second Gulf War* (New York: Routledge, 1992). For the "high command" perspective, see Bob Woodward, *The Commanders* (New York: Simon & Schuster, 1991). For an air-oriented survey, see Stan Morse, ed., *Gulf Air War Debrief* (Westport, Conn.: AIRtime Publishing, 1991). Each of these books has strengths and weaknesses. Friedman's study, for example, is very much shaded by a strong US Navy advocacy. Woodward's book provides some interesting top-level insights, but it suffers from some questions of credibility due to its "pop journalism" style.

2. The official source for definitions used in this study will be Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms,* 1 December 1989. Additional air-oriented terms are taken from the newest USAF doctrine statement: Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force,* vols. 1 and 2, March 1992.

3. Julie Bird, "Air War Legacy," *Air Force Times,* 6 January 1992, 30.

Chapter 1

Theory

Military leadership—especially in combat—is one of the most demanding and challenging of the professions. Although popular mythology emphasizes charismatic personalities, experienced military leaders and historians consider the successful command of armed forces in combat an application of art and science. Military art draws on the creative genius of the commander in finding new approaches to problems and in handling the uncertainty and chance that dominate the conduct of war. Military science views war as a more structured activity, with rational thought, systematic study, and careful planning providing the certain path to victory. Reality involves elements of both approaches, and both art and science grow from a basic foundation of experience and an intellectual/philosophical foundation of theory. Military theory and its component air power theory are important building blocks for commanders and planners in their quest to understand war and to craft operations that will lead to victory.[1]

Military Theory

Military theory is the central theme of this study because it provides a conceptual foundation for the analysis of issues and situations. This foundation, along with the personal experiences of the military officer, shapes the intellectual process of planning and decision making. But while military theory is valuable, the officer cannot follow a cookbook or a checklist approach in applying it. Rather, military theory can only help to guide, providing a perspective and a point of departure for the military officer's evaluation of each unique situation.

Theories are normally based on analyses of historical experiences, but they also involve projections into the future. Such projections are especially prevalent if technological changes were incorporated into the analyses. Military theories are normally the interpretations of experienced military commanders or academic theorists. Examples of significant military theorists include Sun Tzu, Carl von Clausewitz, Antoine Jomini, J. F. C. Fuller, Sir Basil Liddell Hart, and Bernard Brodie.[2] Military theories are based in broad and systematic studies of national power, combat forces, and war—normally focusing on grand strategy (the application of all available instruments of national power) and the supporting national military strategy. Some theories

also focus on more operational or tactical issues, seeking to identify optimal force structures and the best combat techniques in order to ensure victory in combat.

The role of theory was closely examined by Clausewitz in his classic study *On War*. Clausewitz stressed the dominant importance of experience in the development of the commander's skills, but he also emphasized the important role of theory.

> Theory then becomes a guide to anyone who wants to learn from books; it will light his way, ease his progress, train his judgment, and help him avoid pitfalls. . . . Theory exists so that one need not start afresh each time sorting out the material and plowing through it, but will find it ready to hand and in good order. It is meant to educate the mind of the future commander, or, more accurately, to guide him in his self-education, not to accompany him to the battlefield; just as a wise teacher guides and stimulates a young man's intellectual development, but is careful not to lead him by the hand for the rest of his life.[3]

> Theory should cast a steady light on all phenomena so that we can more easily recognize and eliminate the weeds that always spring from ignorance; it should show how one thing is related to another, and keep the important and the unimportant separate. . . . Theory cannot equip the mind with formulas for solving problems, nor can it mark the narrow path on which the sole solution is supposed to lie by planting a hedge of principles on either side. But it can give the mind insight into the great mass of phenomena and of their relationships, then leave it free to rise into the higher realms of action.[4]

Although this concept stresses the value of theory to the individual, theory plays an equally important role in formal education. Professional military education can use military theory to stimulate the officer corps to take a more intellectual approach to problems, leading to enhanced military performance. Theory provides the starting point and an overarching framework for professional introspection.

In addition to their educational value, theories provide the intellectual foundation for the development of strategy and doctrine. Military theories are often conceptual views of strategy. At its broadest level—grand strategy—military theory examines the integration of all the instruments of national power and the relationships of nations in both war and peace. At the next lower level of abstraction, theory focuses on the specific use of military force and the sources of victory in combat operations. In examining the issues of military strategy, operational concepts, tactics, and force structure, theories help shape military forces and their approaches to war.[5]

This impact of theory on armed forces is strongest in the military's doctrine. Doctrine draws heavily on theory to help interpret past combat experiences and to project into the future. Military theory is also an important component of self-assessment, which should be ongoing and applied to doctrine to ensure that it remains fresh and viable. Doctrine is the military's formal guidance or beliefs on the right way to approach a problem and perform a task. Doctrine also often exists as a strong informal culture within a military organization. It is taught in the education system and in the training system, it is codified in manuals and regulations, and it ensures a coherent approach to operations

throughout the military organization. Doctrine also provides guidance for decisions on weapon system development and acquisition, organizational structure, force requirements, force composition, and combat techniques. Additionally, doctrine is used to explain and justify military needs and decisions to outsiders. Although not all military personnel will consciously study theory, they will all be guided by its impact on doctrine and the national strategy.[6]

The broad conceptual framework of theory, which provides a guide for education, thought, and planning, will often produce distinct, explicitly stated ideas. Whether broad concepts, more specific tenets, or firm principles/truisms, these more focused subelements are the most easily remembered and applied aspects of any theory. However, relying on these narrow extracts outside the theoretical context can hide the logic of the theory and actually reduce the thought applied to a military problem. In spite of this potential weakness, these specific elements do serve as important touchstones for military officers. The principles of war are an example of the more refined elements of military theory—simple and straightforward, yet resting on a broader body of military thought.[7]

Operations Desert Shield and Desert Storm illustrated many of the concepts found in military theories—both in the form of the overarching conceptual framework and in the form of more narrow tenets and principles. The influences of selected aspects of military theories were visible in the professional perspectives of senior officers, in the national and military strategies, and in the doctrines that were followed during the war. This is particularly true in terms of air power theory, which provided the foundation for much of the strategic planning and many of the operational decisions in the conflict.

Air Power Theory

The air power theory that provided the intellectual background for Operations Desert Shield and Desert Storm is a relatively new branch of modern military thought. But it is not a totally different approach to war from the traditional theories, and it draws much about the nature of war and its objectives from the mainstream theories. It is a separate branch because its developers and adherents believe that the traditional surface-oriented theories, and the related strategies and doctrines, fail to properly use the capabilities available through operations in the third dimension.[8]

The break between traditional theories and air power theory was magnified by the post-World War II availability of nuclear weapons and their conceptual integration into military theory, strategies, and doctrine. Although many aspects of nuclear-oriented military thought easily merged with air power theory, this relationship created some confusion about the essence of air power theory itself. Operations Desert Shield and Desert Storm, and the changing international security environment after the collapse of the Soviet

empire, have created an opportunity to return to a clearer view of air power thought.[9]

Air power theory is a broad body of thought, although a relatively small number of central beliefs run through it. Its fundamental concepts are found in the works of key theorists—Giulio Douhet, Gen Billy Mitchell, Alexander de Seversky, Sir John Slessor, and Bernard Brodie.[10] Air power theory also is found in the professional writings of military officers,[11] in the curricula of military schools—especially the Air Corps Tactical School in the 1930s[12]—and in the doctrines of the world's air forces.[13] Obvious variations exist, due to differing national cultures and experiences, but a few basic themes run through all air power thought.

Technology and National Power

Air power theory is strongly influenced by the fundamental fact that aerial warfare is, at its essence, technological warfare. Air power technology shapes many strategic and operational concepts, and it carries fundamental implications for basic assumptions concerning the nature of war and the relationships between war and nations.

The technological essence of aerial power is directly related to the economic strength and industrial potential of the advanced states. The ability to design, produce, and support an air power system is a true statement of modern military strength. A strong corollary to this emphasis on technology is the importance placed on qualitative superiority. High capabilities and high costs tend to reduce the emphasis on the traditional military concept of mass, stressing instead the concentration of firepower through technology and aerial maneuver. The theories don't ignore force size—they argue that an adequate number of weapon systems must be maintained to absorb losses and to have the desired effect in war. To ensure that a quality air force is always available, air power advocates call for the development of a national "air mindedness." They want a national commitment to aviation that will sustain the necessary base of scientific and engineering potential, industrial production, and civil and private aviation activities.[14]

The emphasis on national economic power has merged with the evolving nature of modern warfare in air power theory. In modern total war, the entire socioeconomic structure contributes to the success of the war effort; and that structure itself becomes an increasingly important target of military operations. For air power theorists, this is a particularly significant aspect of how to wage and win wars. While naval blockades have historically targeted the enemy's economic base indirectly, operations in the third dimension allow direct attacks on the production capability itself. Thus, air power promises quicker results than the traditional maritime strangulation.[15]

Strategic Bombing

The socioeconomic system, especially the production capabilities of industrial societies, guides much of the grand strategy and military strategy

perspectives within air power theory. Like Clausewitz, air power theories stress the relationships between the military, political leaders, and society. They emphasize the ability to win wars by disrupting this trinity with the proper application of violence. In air power thought, this violence should be directed at both the destruction of capabilities (military forces and production) and the disruption of the psychological will of the enemy (troops, military commanders, national leaders, and the general population). The enemy's will to start or continue a war dominates much of air power theory and is the key to the closely related concept of deterrence theory.[16]

The destruction of a nation's socioeconomic system to influence the national will is vigorously presented in those theories that became identified with strategic bombing. In some of these theories, direct attacks on the civilian population were advocated as the quickest way to influence national will. This school of thought became the symbol of air power theory and the focus of considerable debate over the role of modern combat aviation. The efforts to apply strategic bombing during World War II, and the horrors of nuclear weapons, often led discussions away from the central logic of air power theory to debates founded on narrow interpretations of strategies and flawed applications by inadequate forces.[17]

The critics of air power theory tend to equate strategic bombing to unlimited attacks on civilian populations. Although this was clearly an element in some theories, and was the result of some air operations in the Second World War, it is not necessarily the focus of all air power theory—especially the American branch. In the context of this study, the term "strategic" does not refer to mass attacks on cities. Nor should it be equated to the use of nuclear weapons. Unfortunately, these images are so firmly entrenched that they tend to cloud any discussion of the strategic use of air power.[18]

Strategic military operations are specifically related to accomplishing national objectives. These missions are not defined by the type of weapon or weapon system that is used; rather, they reflect the conceptual division of war into a variety of levels. The strategic level establishes national objectives. The operational level of war involves the establishment of theater objectives and campaign plans that are designed to accomplish the strategic objectives. Tactical operations are the means and methods of combat—battles and engagements—that are used to achieve the operational and, ultimately, the strategic objectives. Air power theory emphasizes the strategic and operational levels of war and the use of air power to directly achieve the strategic objectives; and the emphasis on the strategic value of air operations leads to a central tenet: air power is the decisive factor in modern warfare.[19]

Decisiveness of Air Power

The issue of decisiveness has been the focus of considerable, often hostile, debate over the value and roles of aviation. The conflict is intense because defense budgets are finite and the military services are competing for scarce resources. The emphasis in air power theory on a force-in-being and on

qualitative superiority has led some advocates of air power to claim decisiveness in order to justify larger air forces and smaller surface forces. Many air power theorists (e.g., Douhet and Mitchell) are also very vocal advocates of air power and of strong independent air forces—a fact that contributes to the controversies surrounding the claims of air power decisiveness.[20]

Although most air power writers concede that there are appropriate roles for all military forces, they nonetheless contend that air power can be the dominant factor or a crucial contributing force in virtually any conflict. This claim is particularly strong when the enemy has a large military and a modern socioeconomic structure with a supporting industrial infrastructure. The theories also stress that air power must be employed with due regard to the traditionally important linking of military action to specific and achievable political and military objectives.[21]

The issue of decisiveness revolves around the proper use of available resources to accomplish clear objectives. In strategic operations, air power must be used independently from other forces and without the constraints of providing support for surface actions. The strategic impact to be gained from these attacks flows from the ability of air power to concentrate firepower on carefully selected targets to gain the required destruction and the desired psychological effects.[22]

The Precision Bombing Concept

The most specific conceptualization of decisive air operations is the idea of precision bombing. This does not refer to the tactical ability to place a bomb or missile directly on or near the desired target. Precision delivery of weapons does, however, provide an important capability in the implementation of the broader concept of precision bombing. Precision bombing exists in various forms but is best known as the key development of the US Army Air Corps Tactical School in the 1930s.[23]

Precision bombing rests on the central idea that a systematic analysis of the enemy's political, military, and socioeconomic structures will reveal vital points that should be the focus of air attacks. Precision bombing seeks both effective and efficient combat operations that will have a significant impact on the capability and the will of the adversary. Successful attacks on vital nodes can lead to the collapse of an entire system of targets, and the cumulative effect of these attacks can lead to victory. The targets or sets of targets that may be decisive have also been described as centers of gravity.[24]

Although precision bombing is oriented toward strategic operations—winning the war with air power—the concept also applies to the use of air power at all levels of conflict. This perspective can be seen in the USAF desire to downplay the use of the terms *strategic* and *tactical* to describe forces and in the concept of "indivisible air power." Precision attacks can provide decisive results at the tactical and operational levels, and this capability puts great importance on flexibility and on using aerial capabilities to gain the maximum advantage, while not wasting limited air resources.[25]

Success at the tactical and operational levels of war can flow from the proper use of air power. Especially important is the logical selection of the right targets. Analysis of the adversary should emphasize and identify the centers of gravity, and these should be the focus of the planning process and the targets of air operations. Extensive destruction is not necessarily the objective of precision attacks, even in tactical or operational actions specifically directed against opposing military forces. Rather, air strikes should be designed to quickly disrupt systems, making it impossible for the enemy military to sustain combat operations. Decisive precision bombing campaigns are based on an understanding of the capabilities of air assets, a high quality force structure, and the application of some core operational tenets based on the best possible intelligence.[26]

Importance of Intelligence

To effectively use air power and to ensure its potential for decisiveness, air commanders must emphasize the need to know and understand the enemy. The importance of qualitative superiority demands knowledge of the technological and tactical capabilities of the enemy's military forces. Aerial assets are, after all, finite and can be decisive only if used against the right targets.

Developing intelligence and selecting the right targets are the crucial first steps in using air power. This process is not just collecting information on the location of various targets but is analyzing the data to determine which targets are the most important. Air planning must be founded on an in-depth understanding of enemy forces—what are their capabilities, what are their vulnerabilities, how will they fight, what do they fear? This information must not be based on a mirror image of the same concerns applied to friendly forces. To be truly effective, especially in influencing the psychological reactions of the enemy, air planners and their intelligence advisors must be able to put themselves into the minds of the enemy commanders. They must also merge this understanding of the enemy with the desired strategic objectives. The actual effects of operations must also be constantly evaluated to ensure that the centers of gravity are valid and that air attacks are achieving the desired results. The command and control system must use this feedback to adjust operations as necessary. The aerial weapon will be decisive when it is guided by good analytical intelligence and continuous honest reassessments.[27]

Centralized Command and Control

The effective use of good intelligence and the decisive use of limited air resources demands that air power be centrally controlled, normally at the theater commander level. This ensures that the right targets are hit to gain the maximum effect in support of the strategic objectives. Centralized control also allows senior leaders to use the flexibility, speed, and range of aircraft to respond to changes in the combat scenario.[28]

This centralized control is often resisted by commanders of surface forces because they want to use aerial firepower to support their forces and their

schemes of maneuver. Air power theory warns that this could lead to a failure to exploit the capabilities of aviation and a missed opportunity to create decisive advantages. To ensure that the air perspective is considered, and to maximize the potential value of air power to the senior military commander, air theorists recommend that air assets be placed under the control of a senior air commander who is experienced in aerial operations. This will help to ensure that the capabilities of air power are not misused and that the core operational tenets are followed.[29]

Offensive Action Dominates

The most important operating tenet is that air power is inherently an offensive weapon. It must be used offensively if it is to have a decisive effect on the war. Aggressive offensive operations can also help to overcome enemy defensive actions. Offensive action fully exploits the range and speed capabilities of the aerial weapon and its ability to quickly concentrate firepower on the right target. A rapid and intense offensive campaign can produce a shock effect that amplifies the psychological impact of successful attacks on the enemy's centers of gravity.[30]

The impact of these attacks can be further enhanced by the element of surprise. The two most common sources of surprise are (1) attacking when the enemy least expects it and (2) attacking in a manner that the enemy does not expect. Additionally, new and innovative tactics and technologies can create surprise and enhance the effect of combat operations. Surprise can be achieved at all levels of warfare (strategic, operational, and tactical), and its impact can be enhanced by deception programs. Surprise adds significantly to the psychological effect of aerial attacks.[31]

The offensive attack seizes the initiative from enemy forces and limits their ability to take offensive or counteroffensive action. Taken to the logical extreme, preemptive strikes can give the initiator a significant advantage. The theorists assume that a logical enemy will attempt to conduct offensive air attacks and that defensive operations will have to be performed. Other protective measures—hardening, camouflage, dispersal—will also have to be taken, especially in the early stages of the war, to limit the effects of enemy action. The enemy must not be permitted to use its air power to decisive advantage, and the best way to ensure that this does not happen is by taking offensive action against the opposing air force as soon as the war starts.[32]

Air Superiority Is the First Objective

Another key tenet of air power theory is that air superiority must be the first objective in any conflict. All other uses of the third dimension, including the ability to conduct decisive offensive operations, flow from the ability to control the medium of combat. Control of the air also contributes greatly to the ability of surface forces to perform their missions.[33]

Air superiority means that friendly forces can operate effectively in the air environment and that the enemy is restricted in its ability to interfere with

friendly operations—on the surface as well as in the air. Air superiority is a necessary intermediate objective in all air operations. It may be localized in geographic scope and time, or it may apply to the entire theater of operations. If the battle for control of the air reaches the point that the enemy air force is "incapable of effective interference," the situation is labeled air supremacy. But it does not necessarily follow that friendly forces will suffer no losses; in both conditions (air superiority and air supremacy), although friendly forces have freedom of action, they still may suffer losses.[34]

Air power theory claims that air superiority is best obtained through offensive strikes on the enemy air force. These attacks can destroy aircraft as well as their bases and support structures. In strategic operations, the long-term capability of the enemy to produce and support air forces may also be the focus of attacks. Offensive action may be directed specifically at the enemy's air combat generation capabilities, or it may seek to force engagements with the enemy air force. Offensive action may also disrupt the command and control system, without which the enemy cannot conduct coordinated, well-focused air operations.[35]

The battle for control of the air also may involve defensive efforts, especially early in the war, if the enemy has a significant air force. Defensive operations require an effective centralized command and control net to integrate air and surface defense systems—surface-to-air missiles (SAM) and antiaircraft artillery (AAA)—and to direct effective responses to enemy attacks. But while defensive action can limit the effects of enemy strikes, the core premise in most air power theory is that offensive action is a more efficient and effective way to gain control of the air. The ability to conduct a successful offensive campaign for air superiority rests on good planning and the possession of a quality force.[36]

Quality Wins

As noted in the opening of this discussion, technological superiority is a thread that runs through all air power thought. The emphasis is on quality, and it extends to all aspects of the air force. Quality is the source of success in tactical engagements and in achieving objectives at the operational and strategic levels.

Air power writers stress the need for superior weapons systems but point out that these systems must be part of a well-designed, well-prepared force structure that is guided by valid doctrine and rational campaign plans. The need for a quality force, and the importance of immediate offensive and defensive operations to gain control of the air, combine to produce an emphasis on standing air forces.[37]

The Air Force-in-Being Concept

The crucial role played by air power in the opening phase of a war causes air theorists to emphasize the development of a high quality air force-in-being, even in peacetime. Such a force is necessary to provide the combat

capability required to gain air superiority and to conduct decisive offensive operations at the start of any war. Such a capability cannot be developed quickly, especially under the pressures of a war. The air force-in-being also provides the foundation for deterrence. Beyond the necessary state-of-the-art equipment, the air force-in-being requires highly trained personnel, aggressive organizational training, secure bases, and a solid logistical foundation.[38]

Operations Desert Shield and Desert Storm demonstrated the results of a strong air force-in-being and the application of air power theory. Before exploring the background to the war in Chapter 2 and then analyzing the use of air power in the operations, the remainder of this chapter provides a survey of basic terminology related to the use of air power.

Air Power Functions, Roles, and Missions

Functions, roles, and missions are the legal and doctrinal responsibilities and tasks assigned to US military services and combat forces. These responsibilities and tasks have grown from both the experience of combat and the organizational evolution of the American military establishment. For the USAF, they reflect the influence of air power theory on doctrine and provide a common vocabulary for discussing air operations. This overview of key terms uses definitions from the newest version of Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force,* and Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms.*

The preceding section on air power theory established definitions of *strategic bombing, air superiority,* and *air supremacy* that match the official US military definitions of those roles and missions. However, AFM 1-1 places these terms into a broader doctrinal framework. Strategic attack is a mission within the *force application* role. Air superiority and air supremacy are levels of accomplishment within the broad objective of *aerospace control.*[39]

AFM 1-1 divides the aerospace control role into *counterair* and *counterspace* missions. In Operations Desert Shield and Desert Storm, the counterspace mission was not a factor. Counterair is the mission that provides air superiority and air supremacy. It is subdivided into offensive counterair and defensive counterair operations. Offensive counterair is also complemented by *suppression of enemy air defenses* (SEAD), an "activity which neutralizes, destroys, or temporarily degrades enemy air defenses in a specific area by physical attack and/or electronic warfare."[40]

The air control role creates the conditions for successful force application. Force application refers to attacks against "the full spectrum of enemy capabilities."[41] Strategic attacks are the potentially decisive contribution of air power to the war effort. The other two missions in this category are *interdiction* and *close air support* (CAS).

Both interdiction and CAS are more closely linked to surface operations than is the strategic mission. "Interdiction disrupts, delays, or destroys an

enemy's military potential before it can be used against friendly forces."[42] Interdiction can involve the destruction of enemy combat forces, it can limit the enemy's freedom of maneuver, and it can isolate combat forces from their logistical base. Interdiction can have effects on the strategic, operational, or tactical levels, and it can have its greatest effect when it is used in a complementary relationship with surface operations.[43]

Close air support is "direct support to friendly forces in contact."[44] Air Force doctrine considers CAS the "least efficient" use of air power.[45] However, the mission is considered important in situations that require the highly responsive and concentrated firepower that only air power can deliver. CAS carries risks of friendly casualties and, as a purely tactical-level mission, it can detract from the use of air assets against more valuable operational and strategic-level targets.[46]

"The *force enhancement* role both enables and improves operations of aerospace and surface forces."[47] The missions within force enhancement are crucial to the successful application of air power. *Air refueling* expands the inherent range capabilities of all air power, allowing almost unlimited range for its deployment and employment. *Airlift* uses the range and speed of air operations to provide rapid transportation of forces in deployments or redeployments and timely logistical support of deployed units, especially with critical time-sensitive supplies and equipment. *Spacelift* is an important capability that will become even more critical as space assets continue to grow in importance for both air and surface operations.[48]

Electronic combat and *surveillance and reconnaissance* missions are also in the force enhancement category. Electronic combat reflects the importance of the electromagnetic spectrum to modern warfare for communications, weapons control, and a wide range of other support activities. It is designed to protect friendly use of the medium while degrading the enemy's ability to do so. Surveillance and reconnaissance ensure that the commander has a clear picture of the combat situation. They prevent surprise and allow the commander to identify and target the enemy's centers of gravity. The final category of force enhancement missions is *special operations,* which are conducted by organizations that have special training and equipment.[49]

In addition to the force enhancement missions, air power requires *force support* to sustain its combat capability. The *base operability and defense* mission provides a secure operating location for combat and enhancement forces. Air bases must be able to sustain operations in the face of enemy attacks, which air power theory considers inevitable. *Logistics* and *combat support*—the supplying, maintaining, and sustaining of combat forces in deployment and employment—are important to all aspects of modern warfare. An additional factor in force support, highlighted for the first time in Desert Shield and Desert Storm, is *on-orbit support* for space assets. This mission sustains the support provided to air and surface forces by space resources.[50]

The doctrinal description of basic roles (aerospace control, force application, force enhancement, and force support) and associated missions meshes well with the conceptual framework provided by air power theory. The application

of these contemporary air power roles and missions in Operations Desert Shield and Desert Storm provides the basis for this study and clearly illustrates the basic concepts and core tenets of air power theory.

Notes

1. Although a rather gross oversimplification of the art versus science argument, the different positions can be represented as Clausewitzian or Jominian approaches to war. See Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976); Antoine Henri Jomini, *The Art of War*, trans. G. H. Mendell and W. P. Craighill (Westport, Conn.: Greenwood Press, n.d.), original edition (Philadelphia: J. B. Lippincott Company, 1862).

2. For examples of the cited theorists' works, see Clausewitz; Jomini; Sun Tzu, *The Art of War*, ed. and trans. Samuel B. Griffith (New York: Oxford University Press, 1963); J. F. C. Fuller, *The Conduct of War 1789–1961* (London: Methuen & Co., 1961; reprint 1972); B. H. Liddell Hart, *Strategy* (New York: Praeger Publishers, 1967); Bernard Brodie, *Strategy in the Missile Age* (Princeton, N.J.: Princeton University Press, 1959). For a broad survey of military thought, see Peter Paret, ed., *Makers of Modern Strategy: From Machiavelli to the Nuclear Age* (Princeton, N.J.: Princeton University Press, 1986); and its predecessor, Edward Earle Meade, ed., *Makers of Modern Strategy: Military Thought from Machiavelli to Hitler* (Princeton, N.J.: Princeton University Press, 1943 and 1971).

3. Clausewitz, 141. Book Two, 127–74, provides an extensive discussion of the role of theory.

4. Ibid., 578.

5. For a brief survey of the levels of war, see Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 2, March 1992, 43–47. See also Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 1 December 1989.

6. AFM 1-1, vol. 1, 5, 7; Joint Pub 1-02; Joint Pub 1, *Joint Warfare of the Armed Forces*, 5–6. For broader discussions on doctrine, its value, and its sources, including theory, see I. B. Holley, Jr., "An Enduring Challenge: The Problem of Air Force Doctrine," in *The Harmon Memorial Lectures in Military History, 1959–1987*, ed. Harry R. Borowski (Washington, D.C.: Office of Air Force History, 1988), 425–36; I. B. Holley, Jr., "The Doctrinal Process: Some Suggested Steps," *Military Review* 59 (April 1979): 2–13; Robert C. Ehrhart, "Some Thoughts on Air Force Doctrine," *Air University Review* 31 (March–April 1980): 29–38; Thomas A. Fabyanic, "War, Doctrine, and the Air War College: Some Relationships and Implications for the U.S. Air Force," *Air University Review* 37 (January–February 1986): 2–29; James O. Hale and Barry D. Watts, "Doctrine: Mere Words, or a Key to War-Fighting Competence?" *Air University Review* 35 (September–October 1984): 4–15; Clifford R. Krieger, "USAF Doctrine: An Enduring Challenge," *Air University Review* 35 (September–October 1984): 16–25; David Daulby, "Doctrine Development: Or Why Did We Do It That Way?" in *Air Power: Collected Essays on Doctrine*, ed. Andrew Vallance (London: Her Majesty's Stationery Office, 1990), 17–30; Dennis M. Drew, "Informal Doctrine and the Doctrinal Process: A Response," *Air University Review* 35 (September–October 1984): 96–98; Robert Frank Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force 1907–1964* (Maxwell AFB, Ala.: Air University, 1971), 1–7.

7. AFM 1-1, vol. 2, 9–23; Joint Pub 1, 21–35; I. B. Holley, Jr., "Concepts, Doctrines, Principles: Are You Sure You Understand These Terms?" *Air University Review* 35 (July–August 1984): 90–93.

8. For surveys of air power theory, see Edward Warner, "Douhet, Mitchell, Seversky: Theories of Air Warfare," in Meade, 485–503; and David MacIsaac, "Voices from the Central Blue: The Air Power Theorists," in Paret, 624–47. See also Bernard Brodie, "The Heritage of Douhet," Rand Research Memorandum, RM-1013, 31 December 1953; and Bernard Brodie, "Some Notes on the Evolution of Air Doctrine," Rand Paper P-527, 1 December 1954. For examples of the contemporary American perspective on air power theory, see Charles G. Boyd

and Charles M. Westenhoff, "Air Power Thinking: 'Request Unrestricted Climb'," *Airpower Journal* 5 (Fall 1991): 4–16; Dennis M. Drew, "Joint Operations: The World Looks Different from 10,000 Feet," *Airpower Journal* 2 (Fall 1988): 4–16; Dennis M. Drew, "The Airpower Imperative: Hard Truths for an Uncertain World," *Strategic Review* 19 (Spring 1991): 24–31.

9. For surveys of the nuclear branch of military thought, see Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: St. Martin's Press, 1983); Fred Kaplan, *The Wizards of Armageddon* (New York: Simon & Schuster, 1983); and Greg Herken, *Counsels of War* (New York: Alfred A. Knopf, 1985). For early examples of the impact of nuclear weapons on strategic thinking, see Bernard Brodie, "Military Implications of Nuclear Weapons Development," Rand Paper P-444, 30 October 1953; and Bernard Brodie, "Possible U.S. Military Strategies," Rand Paper P-524, 11 October 1954.

10. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (New York: Coward-McCann, 1942; new imprint, Washington, D.C.: Office of Air Force History, 1983); William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: Putnam's, 1925; reprint, New York: Dover Publications, 1988); William Mitchell, *Skyways* (Philidelphia: J. B. Lippincott Company, 1930); Alexander P. de Seversky, *Victory Through Air Power* (New York: Simon & Schuster, 1942); Sir John Slessor, *The Central Blue* (New York: Praeger, 1957); and Brodie, *Strategy*.

11. For examples, see Gen Carl Spaatz, "Strategic Air Power: Fulfillment of a Concept," *Foreign Affairs* 24 (April 1946): 385–96; H. H. Arnold, "Air Power for Peace," *The National Geographic Magazine* 89 (February 1946): 138–93; and The Viscount Trenchard, *Air Power: Three Papers*, Air Ministry Pamphlet 229, December 1946. For contemporary examples, see Dennis M. Drew, "We Are an Aerospace Nation," *Air Force Magazine* (November 1990): 32–36; Boyd and Westenhoff, 4–15; Barry D. Watts, *The Foundations of US Air Doctrine: The Problem of Friction in War* (Maxwell AFB, Ala.: Air University Press, 1984); and John A. Warden III, *The Air Campaign: Planning for Combat* (Washington, D.C.: National Defense University Press, 1988).

12. For examples of the development of theory and doctrine at the Air Corps Tactical School, see Thomas H. Greer, *The Development of Air Doctrine in the Army Air Arm, 1917–1942*, USAF Historical Studies, no. 89 (Maxwell AFB, Ala.: Air University, 1955), 47–67; and Robert T. Finney, *History of the Air Corps Tactical School, 1920–1940*, USAF Historical Studies, no. 100 (Maxwell AFB, Ala.: Air University, 1955), 26–39.

13. See, for example, AFM 1-1. See also Daulby.

14. Mitchell, *Winged Defense*, vii–xviii, 19–26, 198, 214–16; Mitchell, *Skyways*, 299–302; Douhet, 9–10, 37–38, 193–94, 205–7; de Seversky, 3–7, 203–12, 328–29, 350–54. See also John C. Cooper, "The Fundamentals of Air Power," in *The Impact of Air Power: National Security and World Politics*, ed. Eugene M. Emme (New York: D. Van Nostrand, 1959), 128–35; and Stefan T. Possony, "Elements of Air Power," in Emme, 135–44; Henry H. Arnold, "Air Power and the Future," in Emme, 303–15.

15. Douhet, 5–15, 20, 50–51, 57–61, 167–77; de Seversky, 313–14; Mitchell, *Winged Defense*, xv–xvi, 16–19; Mitchell, *Skyways*, 253–57, 278.

16. Douhet, 7–10, 277–81; Mitchell, *Skyways*, 253–57; Herken, 7–25; Freedman, 2–44; Brodie, *Strategy*, 21–70; Brodie, "Some Notes"; Watts, 5–11, 18, 43–47.

17. Douhet, 7–10, 58–61, 181–82, 195–96; Mitchell, *Skyways*, 253–57. For a survey of the evolution of strategic bombing, see Lee Kennett, *A History of Strategic Bombing* (New York: Charles Scribner's Sons, 1982). For critical assessments of the use of air power in World War II, see also Ronald Schaffer, *Wings of Judgement: American Bombing in World War II* (New York: Oxford University Press, 1985); and Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven, Conn.: Yale University Press, 1987).

18. The confusion over the strategic label was amplified by the emphasis on nuclear weapons in the post–World War II national security strategy of the United States and by the emphasis on nuclear weapons delivery in the Strategic Air Command. From the early 1950s, strategic operations and strategic capabilities have tended to refer only to nuclear deterrence and the potential of nuclear war with the Soviet Union. This clouded the term "strategic" in discussions of any other type of conflict.

19. AFM 1-1, vol. 2, 43–51; Joint Pub 1-02; Warden, 3–5, 289, 307.

20. Mitchell, *Winged Defense,* xv–xvii, 16–26, 214–15; Mitchell, *Skyways,* 255–59, 262; Douhet, 28–33, 103–5, 198–207, 251–62; de Seversky, 254–301.

21. Ibid. See also Boyd and Westenhoff, 4–15; Drew, "Joint Operations," 4–15.

22. See note 20.

23. Greer, 57–58, 115–18; Sherry, 49–61; Schaffer, 28–34; Haywood S. Hansell, Jr., *The Strategic Air War Against Germany and Japan: A Memoir* (Washington, D.C.: Office of Air Force History, 1986), 7–19; Watts, 17–23, 43–47. See also US Strategic Bombing Survey, *Report of the US Strategic Bombing Surveys,* reprint (Maxwell AFB, Ala.: Air University Press, October 1987).

24. Ibid. See also T. Ross Milton, "Strategic Air Power: Retrospect and Prospect," *Strategic Review* 19 (Spring 1991), 7–15; Warden, 9–10; Joint Pub 1, 65.

25. Drew, "Airpower Imperative," 27–29; Warden, 8–10.

26. Douhet, 50–51, 98–99, 192–93, 204–6, 257–58; Mitchell, *Winged Defense,* 134–35, 214–15; Mitchell, *Skyways,* 255–56; de Seversky, 305–7, 321–23; Drew, "Airpower Imperative," 27–29; Warden, 8–10.

27. The selection of the correct targets is often the focus of the debates over the effectiveness of precision bombing in World War II. See Hansell, 33–35, 57–60, 115–33, 259–74. The necessity of understanding the enemy is also heavily founded in older sources of theory (e.g., Sun Tzu, 84). See also Joint Pub 1, 32–35; Douhet, 50–51, 59–61, 119–20; and Arnold, "Air Power and the Future," 306–9.

28. Douhet, 76, 128–29, 191–92; Mitchell, *Winged Defense,* 215–16, 221–22; de Seversky, 333–34; AFM 1-1, vol. 1, 3, 7, 17–18.

29. Ibid. See also Mitchell, *Skyways,* 255–63. The US concept of a joint force air component commander is a manifestation of this belief in the centralized control of air power. See Joint Pub 1-02.

30. Douhet, 15–16, 19–23, 49–52, 126–29; Mitchell, *Winged Defense,* 16–17, 119, 216; Mitchell, *Skyways,* 235, 255–63; Hansell, 1–19; Warden, 8–10.

31. Douhet, 49–51, 196–97, 202. For background information on the role of surprise in war, see Barton Whaley, *Strategem: Deception and Surprise in War* (Cambridge, Mass.: Massachusetts Institute of Technology, 1969); Klaus Knorr and Patrick Morgan, eds., *Strategic Military Surprise: Incentives and Opportunities* (New York: National Strategy Information Center, 1983); Richard K. Betts, *Surprise Attack: Lessons for Defense Planning* (Washington, D.C.: Brookings Institution, 1982); and Michael I. Handel, *War, Strategy, and Intelligence* (London: Frank Cass and Company, 1989).

32. Douhet, 15–18, 28–31, 52–55, 196–98, 202; Mitchell, *Winged Defense,* 199–213; Mitchell, *Skyways,* 235, 287–89; de Seversky, 130–31, 305–20; Warden, 25–76; P. D. L. Grover, "Air Supremacy—The Enduring Principle," in *War in the Third Diminsion: Essays in Contemporary Air Power,* ed. R. A. Mason (London: Brassey's Defence Publishers, 1986), 59–80; AFM 1-1, 11; Brodie, Strategy, 173–263.

33. Grover, 59–80; Mitchell, *Winged Defense,* xv–xvi, 16–17, 25–26, 199; Douhet, 28–30, 95–99, 103–14, 128–29, 196–98; Trenchard, 6–12; Warden, 13–24.

34. Ibid. See also JCS Pub 1-02; AFM 1-1, vol. 1, 6, 10–11; vol. 2, 273.

35. Douhet, 28–31, 34–35, 49–55, 191–92; Mitchell, *Winged Defense,* 16–17, 199; Mitchell, *Skyways,* 287–89; Trenchard, 18–21, 37–38; P. R. C. Groves, "Our Future in the Air," in Emme, 176–81.

36. Douhet, 52–55, 59, 95–99, 110–14, 193, 241–43; Mitchell, *Winged Defense,* 199–216; Mitchell, *Skyways,* 282–89.

37. Douhet, 6, 62, 69, 114, 131; Mitchell, *Winged Defense,* 19–21, 127, 198; Arnold, "Air Power for Peace," 138, 153, 160, 171, 193. For a survey of the relationship between technology, doctrine, and military organizations, see I. B. Holley, Jr., *Ideas and Weapons: Exploitation of the Aerial Weapon by the United States During World War I; A Study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* (Hamden, Conn.: Archon Books, 1971; reprint of 1953 edition).

38. Douhet, 28–31, 56, 75–76, 95–99, 130–31, 136–38, 197, 204; Mitchell, *Winged Defense,* 24–26, 31–32, 127, 198; Mitchell, *Skyways,* 289; Arnold, "Air Power and the Future," 303–6.

39. AFM 1-1, vol. 1, 6–7, 10–12; vol. 2, 103–12, 147–60, 302. See also JCS Pub 1-02.

40. AFM 1-1, vol. 1, 6–7, 10–11; vol. 2, 135–46, 269, 273, 299–300, 304. See also Joint Pub 1-02.
41. AFM 1-1, vol. 1, 11.
42. Ibid., vol. 1, 12.
43. Ibid., vol. 1, 12–13; vol. 2, 161–72, 271, 288.
44. Ibid., vol. 1, 13.
45. Ibid.
46. Ibid.; vol. 2, 161–72, 276.
47. Ibid., vol. 1, 13.
48. Ibid., vol. 1, 6–7, 13–14; vol. 2, 185–97, 271–72.
49. Ibid., vol. 1, 7, 14; vol. 2, 185–97, 283, 298, 301, 304.
50. Ibid., vol. 1, 7, 14–15; vol. 2, 199–208, 270, 277, 291, 301.

Chapter 2

The Background to US Action

The application of military force in the liberation of Kuwait, conducted within the context of long-standing US interests in the Persian Gulf region, was founded on a long history of rapid-response contingency planning. The deployment and employment of air power in Operations Desert Shield and Desert Storm must be examined within the setting of this background. This chapter provides a brief survey of US interests in the region with emphasis on US military concepts and organizations before the Iraqi invasion, US assessments of the Iraqi military threat, and the broad strategic objectives established by the United States and the international coalition after Iraq invaded Kuwait.

US Interests in the Persian Gulf

The key point of departure for American involvement in the Persian Gulf region was World War II and the immediate postwar period as the battle lines of the cold war were being drawn. The region had served as a conduit for allied lines of communication (LOC), including the movement of supplies to the Soviet Union through Iran. In the early cold war period, the US focused on keeping the region in the Western "camp" as part of the overarching security concept of containment. Iran became a key link for US military involvement in the region, and remained a focal point of planning even after the overthrow of the Shah in 1979.[1]

Oil production increased the region's importance to the United States and other free market economies, especially after the Organization of Petroleum Exporting Countries' (OPEC) oil boycott in 1973. Concern about the West's heavy reliance on oil from the Persian Gulf merged with the cold war rationale for US interest and involvement in the American planning process in the 1970s. US planners focused on the potential for Soviet military forces to move into Iran and seize the critical oil reserves of the Persian Gulf. This central concern dominated US contingency planning for the region until approximately 1989.[2]

The Iran-Iraq War of 1980–1988 amplified US concerns over oil availability and regional stability. These concerns, along with American efforts to mediate the Arab-Israeli dispute, produced a growing emphasis in US national security policy on the cultivation of regional stability. President George Bush

gave high priority to the general concept of regional stability through his advocacy of a "New World Order" in the aftermath of the cold war. The objective of regional stability and security was further reinforced by growing concerns in the US about "the proliferation of nuclear, chemical, and other weapons of mass destruction, the means to produce them and associated long-range delivery systems."[3]

Iraq's military power and its invasion of Kuwait represented a direct challenge to a range of basic US security concerns over oil, weapons proliferation, and both regional and global stability. These concerns drove and shaped the US response. The military component of American action grew from post-World War II quick-reaction plans and experiences.[4]

US Contingency Concepts

The US military has an extensive history of preparations for rapid-reaction scenarios and for specific Persian Gulf contingencies. These rapid-response concepts involved two broad objectives. The first was to deter potential aggressive action. This could be accomplished by having the capability to deploy enough force to demonstrate resolve or through the actual deployment of such a force. The second objective, an extension of the first, was to be able to defeat an aggressor by deploying and using adequate combat power. Although joint operations involving all US armed services have dominated the planning process since the Goldwater-Nichols Department of Defense Reorganization Act of 1986, US rapid response options have traditionally been built around smaller joint concepts, involving either a Navy/Marine team or an Air Force/Army team.[5]

The Navy and Marine capability emphasizes sea power and the flexibility of a large aircraft carrier battle group or task force. The concept evolved from the tactics used during the island-hopping campaigns in the Pacific Theater during World War II. A carrier task force deployment can show a standing US interest in an area. A task force movement into an area can signal American concern, and it can deter aggression. Additionally, carrier aircraft can strike quickly against land targets when necessary. The carriers can be very responsive from forward deployed locations, and they avoid the political hassles often associated with overseas bases. Aircraft carriers are also important targets, however, and much of the combat potential of task forces and carrier air wings must be devoted to the defense of the carriers. Even with these defensive requirements, the offensive strike potential of the carrier can be employed in a manner very consistent with air power theory as described in the introduction. However, Navy strike warfare has traditionally emphasized tactical targets which support maritime and Marine operations.[6]

The Marine contribution to the sea-based rapid-reaction capability is the Marine Air/Ground Task Force (MAGTF), a fully integrated air-land combat force that merges light, primarily infantry, forces with the flexible firepower

of both helicopters and fixed-wing aircraft. The MAGTF can be structured in a variety of sizes, depending on the contingency scenario. Regiment-sized forces, Marine expeditionary units (MEU), are routinely forward-deployed for rapid response to regional problems. These units can be expanded to Marine expeditionary brigades (MEB) quickly. With more logistic support and more deployment time, the MEB can be further expanded to a Marine expeditionary force (MEF). The MEF includes a division, an air wing, and extensive support capabilities. All MAGTFs are initially self-contained combat forces, but any sustained combat operations would require an expanded logistical network.[7]

The quick reaction capability of the MAGTFs and carrier task forces is complemented by the Air Force and Army contributions to rapid-reaction contingency planning. These capabilities emerged in the 1950s as the two services sought to provide a national response to the "brushfire wars" which critics contended were undercutting the national policy of "massive retaliation." Both the Air Force Composite Air Strike Force (CASF) and the Army Strategic Army Corps (STRAC) relied on the speed and range capabilities of aircraft to respond to security threats from the continental United States (CONUS). This pattern remains at the core of Air Force and Army contingency operations today.[8]

The US Army's rapid-response concept is based on the airlifting of a division, normally the 82d Airborne Division, or at least its "ready brigade," directly to the trouble spot. The airborne forces are complemented by other light infantry divisions developed in the 1980s as Army planners focused on the problem of regional conflicts. Although these light forces can be airlifted quickly from the CONUS, they still require sealift logistical support for sustained combat operations. Airlift can provide the initial deployment and some sustaining logistical support for critical resources, but it cannot sustain large-scale ground operations.[9]

Extensive ground combat operations may also require the movement of heavier Army combat units. This reinforcement might be an absolute requirement in some areas of the increasingly advanced third world combat arena. These forces would have to be sealifted and would require extensive logistical support. The Army and Air Force have joined the Marine Corps in partially solving the immediate logistical problems by forward-positioning ships containing equipment and supplies. These ships can support the deployment and sustain combat operations until the sealift link to the CONUS is established. Logistical problems remain the most challenging aspect of contingency planning for US defense planners.[10]

The Army rapid-response forces, like the MAGTFs, depend on air support to provide heavier firepower. Part of this firepower is provided by the armed helicopters that are integrated into the Army's force structure. However, the Army also must rely on the Air Force to provide air superiority and additional fire support when needed. Therefore, Air Force units must deploy to the theater before or at the same time as the Army forces.[11]

Air Force contingency concepts also include independent deployments that can support indigenous ground forces. The Air Force's rapid-reaction concept

evolved from the operations of the tactical air forces in World War II and from the 1950s concept of Composite Air Strike Forces. Air Force planners expect to exploit the range and speed of aircraft to rapidly position combat forces in or near the problem area. Air Force planners also expect to be able to quickly concentrate firepower on key targets, potentially from great distances.[12]

Air Force planners recognize that the primary vulnerability, and the primary restraint, of land-based air power is the base structure that is needed to support modern aircraft. Therefore, the Air Force has always stressed the importance of both advanced preparation in regions of potential operations and the capability to operate out of very austere bases—the bare base concept. If a secure location having an adequate runway/taxiway/ramp structure and a water supply is available, the USAF will deploy all other resources needed to conduct sustained combat operations there. Air Force contingency plans also include the concept of long-range offensive operations, potentially intercontinental, if local air bases are not available or are not adequate to sustain the desired levels of activity.[13]

Air Force and Army capabilities for contingency operations merged in the late 1950s to form Strike Command. Although this joint organization eventually faded away, Strike Command and its successor, Readiness Command, were the precursors of the joint headquarters structure that directed the liberation of Kuwait.[14]

US Contingency Planning

The increased interest in the Persian Gulf region in the late 1970s led to fears that the existing planning process and associated force structure would not adequately support a US response to problems in the area. The importance of the region was further emphasized when the president declared the security of the region a vital interest of the United States. As a response to US concerns and as a signal of American commitment, the Department of Defense created the Rapid Deployment Joint Task Force (RDJTF) in 1981. The RDJTF was tasked with planning for a potential US deployment into Southwest Asia in response to a Soviet threat to the Persian Gulf oil fields.[15]

The RDJTF tasking was a complicated assignment, given the mixed requirement of rapid movement into the theater and the need to engage heavy Soviet ground forces. The RDJTF planning process highlighted the extensive logistic problems involved in moving heavy force to the region and sustaining high-intensity combat for an extended period of time. The resulting plans merged the concept of rapidly deployed combat forces—especially airlifted personnel—with prepositioned logistical support. The Marines deployed maritime prepositioning ships (MPS) to support a MEB; and the Army and the Air Force prepositioned materiel on afloat prepositioning ships (APS) and at selected locations on land in the Gulf region.[16]

The RDJTF also exposed many of the challenges associated with merging the various service and command perspectives and approaches into a coherent operational concept. The Navy/Marine and Army/Air Force concepts described above, while potentially complementary, did not always mesh well. Certain doctrinal points on command and control, especially related to air power, were particularly difficult issues. These service-based differences were compounded by the differences between the major unified commands—European Command (USEUCOM), an Army-dominated command; and Pacific Command, a Navy-dominated command. These bureaucratic and doctrinal problems, and the increasing importance of the region to US national security policy, led to the upgrade of the RDJTF to a unified command in 1983. The increased status included a four-star commander in chief (CINC).[17]

The increased status and expanded powers that the Goldwater-Nichols Act of 1986 gave the CINC helped overcome some of the organizational obstacles and focused the planning process on joint operations in the Persian Gulf and Southwest Asia region. Although the flexibility of the assigned forces allowed the command to respond to a range of potential problems (e.g., the escorting of reflagged Kuwaiti oil tankers during the Iran-Iraq War), the planning emphasis remained on a potential Soviet move into the region until 1989. Nevertheless, the assigned objectives for Central Command were much broader than just the worst case Soviet threat:

- To ensure continued access to Arabian Peninsula oil
- To maintain an effective and visible US presence throughout the region
- To assist friendly states to improve their own defensive capabilities
- To prevent the military coercion of friendly states
- To deter or, if necessary, counter aggression directed against vital US interests[18]

To support this set of objectives, the USCENTCOM planners had access to a range of military forces, though located mostly outside the region. For political reasons, the only full-time US presence in the region was the Joint Task Force Middle East, a small naval element built around the command and control ship *Lasalle*. The staff on this ship functioned as the advanced echelon (ADVON) for the USCENTCOM headquarters located at MacDill Air Force Base (AFB) in Florida. Additionally, carrier battle groups or task forces located in the Indian Ocean and the Mediterranean Sea could steam to the area relatively quickly. One or two MEUs might be available, but the bulk of any ground combat capability and supporting land-based air power would have to deploy from CONUS bases.[19]

The combat forces apportioned to USCENTCOM included three carrier battle groups, one surface action group, and five amphibious groups. The dedicated Marine Corps forces included one MEF and one MEB. Army forces included the XVIII Airborne Corps (an airborne division, an air assault division, a mechanized infantry division, two infantry divisions, and an air cavalry brigade). The USAF contribution under Ninth Air Force consisted of seven tactical fighter wings, two strategic bomber squadrons, and a variety of sup-

port aircraft. An additional three and one-half fighter wings were available if needed.[20]

The US perception of threats to the Persian Gulf region underwent a significant revision in the late 1980s. Although concerns remained about Soviet interest and involvement in the Persian Gulf, the perception was that Soviet capability and willingness to actually invade the region was declining. Additionally, senior US leaders recognized Iraq's growing military capability and its threat to regional security. Therefore, in 1989, Central Command began to emphasize Iraqi aggression as the focal point of contingency planning. By the spring of 1990, USCENTCOM operational concepts had been revised and worked into a draft of a new theater plan, labeled 1002-90. USCENTCOM evaluated the concept during the summer in a wargaming simulation called Internal Look. This planning laid the foundation for the initial US reaction to the Iraqi invasion (Operation Desert Shield) and was the starting point for the campaign plan for the liberation of Kuwait (Operation Desert Storm). To US military and political leaders, the Iraqi military represented a serious challenge.[21]

The Iraqi Threat

The Iraqi military that invaded Kuwait was viewed as a large, highly capable combat force. The ground forces in particular were considered to be battle tested from the war with Iran. The reputation of the other services did not match that of the ground forces, though the air force was considered to be well equipped and potentially troublesome. The navy was viewed largely as a defensive and harassing force. The military was strengthened by the presence of better trained and presumedly more highly motivated Republican Guard units, which were viewed as a strong core for the remainder of the conscript-based force. Although various sources offered a range of estimates on Iraqi strength, its army was often portrayed by US officials as "the fourth largest army in the world," and its air force "the sixth largest."[22]

Based on its performance against the Iranians, the Iraqi army was expected to fight well, especially in defensive situations. Although primarily an infantry force, it also had a significant armor component and an impressive artillery capability. Much of its equipment was of first-rate quality by any standard, but its inventory also included many obsolete designs. The following estimates are drawn from a variety of sources; they represent an approximation of the Iraqi army's overall strength (not just Kuwaiti theater assets):[23]

Total Manpower: 1.2 million
Combat Units: 7 armored or mechanized divisions
40 infantry divisions
8 Republican Guard divisions
(including 2 armored and 1 mechanized)

Heavy Equipment:	5,500	tanks
	7,500	armored personnel carriers
	3,500	artillery tubes
	90	surface-to-surface missile launchers
	600	surface-to-air missile launchers
	150	attack helicopters

The Iraqi navy, considered a much lower threat than the army, was a small coastal defense force. Its most serious capability rested in its missile-armed vessels and mine warfare equipment. Its inventory included only 45 combat ships and boats (five frigates and 40 smaller craft)—but Iraq's naval forces were complemented by land-based antiship missiles (the Chinese Silkworm system) and air-launched antiship missiles (such as the Exocet that damaged the USS *Stark* in the "accidental" 1987 attack). These Iraqi capabilities, especially the air force contribution, comprised a threat to sea LOCs and a challenge to planning for an amphibious operation.[24]

The Iraqi air force was seen as a potentially much more dangerous threat than the navy, although it did not have the combat-hardened reputation of the army. Its equipment included a small number of modern, top-of-the-line fighters and a substantial inventory of older-generation aircraft. However, as is always the case with air power, the training of the pilots and the combat doctrine that guides operations have a significant impact on the performance of an air force in combat. Western analysts tended to denigrate the combat potential of the Iraqi air force due to its performance in the Iran-Iraq War and its training patterns.[25]

The Iraqi air force had been used in the classical pattern of air power theory at the start of the Iran-Iraq War; that is, to attack Iranian airfields. These strikes seemed designed to seize air superiority and preempt Iranian air operations, but they were almost completely ineffective—and they set the standard for most Iraqi air operations for the rest of the war. The Iraqi air force did engage in periodic offensive operations, including strikes on strategic targets—cities and large oil facilities—in Iran, but most of its operations were defensive responses to limited Iranian offensive strikes. Its operations were generally ineffective, whether offensive or defensive. And the somewhat negative Western view of the Iraqi air force was reinforced by its use of Soviet-style training and tactics: low flying time, limited individual initiative, and tight ground control.[26]

Despite the perceived weaknesses of the Iraqi air force, its size (over 600 combat aircraft) and the presence of some highly capable modern aircraft (MiG-29 and Mirage F-1) made it a threat that could not be ignored. Its large aircraft inventory was complemented by an extensive ground-based command and control system, numerous surface-to-air missile launchers, and a massive hardening program that protected the aircraft and the supporting infrastruc-

ture on the ground. The following rough estimation of the core of Iraqi air strength was drawn from a number of prewar sources:[27]

Fighters:	40	MiG-29
	30	Mirage F-1
	150	MiG-21/F-7
Fighter-Bombers:	70	Mirage
	16	SU-24
	90	MiG-23
	70	SU-20
	60	SU-25
Bombers:	16	TU-16/TU-22

Although outside observers viewed the actual combat capability of the Iraqi air force with suspicion, the combination of Iraqi ground and air power was considered to be decisively superior to the military capabilities of the other Arab states in the Persian Gulf region. Iraq was also considered strong enough to be a serious threat for the light forces that the United States could deploy quickly. The Iraqis also had the capability to conduct strategic attacks with ballistic missiles—a capability they had used against Iranian cities in the latter portion of their decade-long war.[28]

The substantial conventional Iraqi force structure was complemented by extensive nuclear, chemical, and biological warfare programs. The nuclear program was, in fact, a major concern of the United States—and one of the key motivations for the extensive US response to Iraqi aggression. Although Saddam Hussein may have felt that he was building international power and prestige for Iraq with his wide-ranging weapons development programs, they were in fact so threatening that they caused a shift in US planning and helped the US focus its objectives for the war.[29]

US Objectives

The foundation of the US military reaction to the 2 August 1990 Iraqi invasion of Kuwait was provided by US national policy and by the president's statement on 5 August. He outlined these specific objectives:

- Immediate, complete, and unconditional withdrawal of all Iraqi forces from Kuwait
- Restoration of Kuwait's legitimate government
- Security and stability of Saudi Arabia and the Persian Gulf
- Safety and protection of the lives of American citizens abroad[30]

These objectives and national policy concerns shaped the specific military objectives that emerged during the Desert Shield phase of the US response. From this guidance and from the foundation of existing contingency opera-

tions concepts, US military planners developed the military strategy and the air campaign plan that were used in Desert Storm.

Notes

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2. Johnson, 122–60; Nelson, 32–37; "The Middle East and Southwest Asia," *Defense 90*, January/February 1990, 17–22; H. Norman Schwarzkopf, "Turmoil: Middle East—Business as Usual," *Defense 90*, May/June 1990, 24–30.

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4. For a summary of US use of force in contingencies in the post–World War II period, see Barry M. Blechman and Stephen S. Kaplan, *Force without War: U.S. Armed Forces as a Political Instrument* (Washington, D.C.: Brookings Institution, 1978). See also Eliot A. Cohen, "Constraints on America's Conduct of Small Wars," *International Security* 9 (Fall 1984), reprinted in *Conventional Forces and American Defense Policy*, ed. Steven E. Miller and Sean M. Lynn-Jones (Cambridge, Mass.: The MIT Press, 1989), 325–55.

5. See Blechman and Kaplan for a broad survey of rapid-reaction concepts and roles. For the basic contingency concepts see Crist, 19–21; Paul F. Pugh and Thomas C. Linn, "Rediscovering the Force-in-Readiness," *Armed Forces Journal International*, August 1989, 62–65; "Rivalries among the Branches," *Congressional Quarterly Weekly Report*, 5 January 1991, 27; Andy Pasztor and John J. Fialka, "Wrong War," *The Wall Street Journal*, 28 August 1990, A1, A4; John D. Morrocco, "New Pentagon Strategy Shifts Focus from Europe to Regional Conflicts," *Aviation Week & Space Technology*, 13 August 1990, 25.

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7. For surveys of MAGTF concepts, see United States Marine Corps, *United States Marine Corps Concepts and Issues* (Washington, D.C.: Government Printing Office, 1991), 1-1 thru 1-10; *Employment of Navy and Marine Forces*, 81–94. See also Robert R. Ropelewski, "Marines Sharpen Focus on Low-Intensity Conflicts," *Armed Forces Journal International*, August 1991, 54–56; Pugh and Linn, 62–65; Calvin H. Cobb, "The Semper Fi Tradition," *Sea Power*, September 1990, 7–8; Vincent C. Thomas, "Ready to Fight—And Win," November 1990, 12–21; Andrew N. Pratt, "Low Intensity Conflict and the United States Marine Corps," in Dean, 289–312.

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13. Nix, 139–54; Mets, 8, 151; Rice, 5–6.

14. Iungerich, 110–11; Anthony H. Cordesman, "US Power Projection Capabilities in the Gulf, Indian Ocean and Red Sea," *Armed Forces*, December 1988, 566–70; Schwarzkopf, 24–30.

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18. Schwarzkopf, 24–30.

19. Cordesman, 566–70.

20. "The Middle East," 18–19; *Department of Defense Report to the President and Congress* (Washington, D.C.: Government Printing Office, 1987), Chart III.H.3; Cordesman, 570.

21. Richard Mackenzie, "A Conversation with Chuck Horner," *Air Force Magazine*, June 1991, 57–58; Blackwell, 85–86.

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24. IISS, 106; Friedman, 206–13, 361–64; Blackwell, 44–45.

25. David A. Fulghum, "Analysis Indicates Iraqi Air Force Weak on Innovation, CAS Role," *Aviation Week & Space Technology*, 17 September 1990, 113; Chadwick, 26–27; Blackwell, 39–41; Friedman, 24–26, 307–8.

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27. IISS, 106; Blackwell, 39–41, 46–48; Chadwick, 27; Friedman, 307–8.

28. Blackwell, 29–66; Cordesman and Wagner.

29. Chadwick, 58–59; Blackwell, 30–37; Friedman, 43–46.

30. Dick Cheney, *Conduct of the Persian Gulf Conflict: An Interim Report to Congress* (Washington, D.C.: Government Printing Office, July 1991), 1-1.

Chapter 3

Air Power and Desert Shield

In reaction to the Iraqi invasion of Kuwait, and the potential threat to Saudi Arabia, President Bush quickly committed the United States and its resources in opposition to continued Iraqi aggression. He also developed an international consensus through the United Nations and through aggressive personal diplomacy. The diplomatic efforts and insightful national-level leadership produced a direct linkage between the deployed military forces and clear political objectives.[1] The National Command Authorities (NCA—the president and the secretary of defense) also defined clear military objectives for the forces involved in Operation Desert Shield, the nickname for the deployment and preparation of American forces that culminated in Operation Desert Storm. Air power was the cornerstone of both.[2]

Air power provided the speed and range capabilities necessary for responding to this threat to international security. The time factor was especially important in the early days of the crisis because American intelligence experts and national leaders were uncertain of Saddam Hussein's intentions. The major fear was that he would order his forces to advance south and seize the Saudi oil fields. The NCA directed the American military to quickly deploy a force that would have a deterrent effect, and then "build and integrate coalition forces" and enforce the sanctions against Iraq. The buildup was to reach a level of force that could defeat any additional Iraqi aggression. Air power provided the foundation for accomplishing all these missions, from the rapid deployment of visible combat potential through the development of an offensive capability.[3]

Desert Shield involved an initial rapid reaction and a two-phase buildup. The first phase provided a defensive screen for Saudi Arabia and, later, an aerial counteroffensive capability. The second phase created an air and ground offensive capability for the liberation of Kuwait. After a secure presence and a strong defense were established, the in-theater forces devoted considerable energy to preparing for combat. The plan rested on the ability of the initial deployment to deter or defeat any further aggression by Iraq. Throughout Desert Shield, from the earliest hours, the coalition commanders relied heavily on the capabilities and characteristics of air power.[4]

Deterrence

Time was a critical factor because the Saudi military was too small to counter the Iraqi threat and the American deterrent force had to be moved great distances. Due to political sensitivities, no significant combat forces were located in the Persian Gulf region when the Iraqi army invaded Kuwait. Such a situation had been anticipated, however, and USCENTCOM contingency plans were designed around the rapid movement of forces into the theater.[5]

Forward-deployed US Navy and Marine Corps forces quickly steamed toward Saudi Arabia and the Air Force flew the initial air and land forces directly into Saudi Arabia from the CONUS. Time was important because of the 7,000-nautical-mile air route and the 12,000-nautical-mile sea route from the CONUS to the theater. The deterrence objective demanded a timely deployment that could only be done by air; but these forces needed the backing of Navy and Marine units that had previously been deployed near the area.[6]

The concept of deterrence has been most closely associated with nuclear planning, but it is also important to conventional forces. To deter further aggression by Iraq, the US had to demonstrate both the capability and the will to resist an advance into Saudi Arabia. To accomplish this objective, American forces had to arrive quickly and present to Iraqi planners the threat of defeat, unacceptable losses in combat, and/or retaliatory punishment inflicted on Iraq itself.[7]

The speedy aerial deployment of forces directly into Saudi Arabia from the United States was especially important as a symbol of American commitment and will. The airlift was an important statement to the world community, especially to the countries that the United States and Saudi Arabia were recruiting for the anti-Iraq coalition. The deployment was also a clear message to Saddam Hussein that the US would not accept any further aggression. The focal point of deterrence is the mind of the adversary, and American planners wanted to be sure that their message registered with Saddam Hussein.[8]

Coalition leaders were uncertain as to what impact the message would have because of the unpredictable behavior of the Iraqi leader. He had repeatedly and recently denied having any intention to invade Kuwait, and some of his pronouncements indicated that he did not think the United States had the will or the stomach to fight his kind of war. Additionally, he apparently did not accept the combat potential of modern air power. His interpretation of Vietnam and the post-Vietnam opposition to wars by the American populace also colored his view of the situation. To counter this perspective and sway his perception, and to provide adequate forces if deterrence failed, the US deployed a large and powerful combat force. Additionally, the United States conducted an aggressive information collection effort that relied heavily on the aerospace high ground.[9]

The Aerospace High Ground

When armies first experimented with aircraft, surveillance and reconnaissance were the earliest missions. The USAF still considers them to be important force enhancement roles for aerospace forces. The ability to collect information from the aerospace environment is invaluable to modern military commanders. Some of the aircraft deployed earliest to the Persian Gulf region (the E-3A Sentry and the RC-135 Rivet Joint) were deployed to enhance the information collection needed for strategic and tactical decisions. These aircraft were joined by U-2/TR-1 aircraft from the Strategic Air Command (SAC) and by RF-4C Phantom IIs, initially provided by the Air National Guard. Eventually, USCENTCOM also gained the services of the E-8 joint surveillance and target attack radar system (JSTARS), a prototype airborne radar that can locate ground targets such as tanks and trucks. Additionally, national technical collection capabilities were sharply focused on the region to provide information for both NCA and USCENTCOM.[10]

The value of this information cannot be overstated, but it must be processed and analyzed before it is truly useful to the commander. Before the invasion of Kuwait, US surveillance resources had monitored Iraq's army while it massed on its neighbor's border. The capability to invade was clear; the intent was not. This situation illustrates the reality that information gathered by technical sources cannot always provide clear insights on future action. It also highlights the importance of having the analytical capability to transform raw information from a variety of sources into useful intelligence—not an easy proposition, especially when dealing with an unpredictable actor such as Saddam Hussein.[11]

The aggressive data collection effort ensured that Iraq could not gain the advantage of surprise as coalition forces were built up in Saudi Arabia. The intelligence provided indications and warnings of pending Iraqi moves. Additionally, the information provided important clues on the success of the deterrence mission. As the deployment progressed, aerospace platforms tracked Iraq's military capabilities and helped develop insights on potential vulnerabilities and targets. But while these intelligence efforts were important, the success of the deterrence mission also rested heavily on the rapid movement of visible coalition combat forces.[12]

Deploying Combat Power

USAF fighter units, supported by aerial refueling, were in-theater within a matter of hours. Many of these US aircraft carried ordnance during the deployment so that combat operations could begin immediately upon their arrival in-theater.[13]

F-15C Eagles of the First Tactical Fighter Wing were on air defense alert in Saudi Arabia within 34 hours of deployment notification, highlighting the global mobility of modern combat air power. The initial squadron flew 7,000 miles in 15 hours with no stops en route. Forty-five aircraft were on the ground in Saudi Arabia within 53 hours of the order to move.[14]

The Royal Air Force (RAF) demonstrated a similar responsiveness. A Tornado air defense squadron was flying operational air defense missions less than 50 hours after the British decided to deploy in Operation Granby.[15]

Within five days, the USAF had moved five fighter squadrons. Within two weeks, the US had deployed 500 aircraft, 450 of which were from the continental United States. The US Navy and the US Marine Corps, as well as other coalition partners, also contributed to the rapid buildup of an impressive air armada.[16]

Air Superiority Forces

These air forces were moved and postured in concert with the core concepts of air power theory. Air superiority was the absolute first priority. The F-15Cs and RAF Tornados joined the Royal Saudi Air Force (RSAF) in protecting friendly forces from attack by the Iraqi air force (IQAF). US Navy F-14 Tomcats and Navy and Marine Corps F/A-18 Hornets added to this defensive capability. US Army air defense artillery units—Patriot missile systems and short-range Stinger missiles—were also deployed in the early days of Desert Shield.

The early emphasis on air defenses reflected the respect that American planners had for the offensive potential of the large air force in Iraq. US planners also kept in mind the necessity of gaining air superiority in order to complete the deployment and conduct whatever other operations might be required. The coalition's air defenses and intelligence-gathering capabilities ensured that the IQAF could not gain the initiative through offensive action against Saudi Arabia.[17]

Ground Attack Forces

The second objective of the coalition buildup was to counter the ability of the Iraqi Army to advance beyond Kuwait. Therefore, the aircraft coming into the theater after the air superiority fighters had arrived included ground attack fighters and multirole aircraft that could attack armored forces. The A-10 Thunderbolt II was valued by the US Army for its tank-killing potential and for the firepower that it could contribute to a ground battle. The Marine Corps AV-8B Harrier and Marine and Army attack helicopters—AH-1W Cobra and AH-64 Apache—added to the aerial firepower available to the ground forces. Multirole aircraft, especially the USAF F-16s and Marine Corps F/A-18s, were extremely important to this initial force structure as they epitomized the flexibility of air power. The F-16 Fighting Falcon and the F/A-18 Hornet could fight in the air superiority battle and/or be used to attack enemy ground targets, depending on the demands of the situation.[18]

Offensive Forces

The rapidly established defensive capability served as a protective cover for the rest of the movement and provided a secure foundation for any necessary combat operations. However, the evolving operational concept quickly followed the guidance of air power theory, emphasizing the offensive role of air power. Early in the deployment, the USAF deployed long-range ground attack aircraft—F-15E Strike Eagles, F-117A stealth fighters, and F-111Fs—that could take the battle deep into Iraq with precision attacks against key targets. British and Italian Tornados added to the deep penetration capabilities of the coalition, and US Navy A-6 Intruders provided a long-range strike capability from carriers in the Red Sea or Arabian Gulf. B-52G Stratofortresses from SAC contributed long-range, heavy-payload striking power from bases near the region, such as on Diego Garcia in the Indian Ocean, and from bases in the CONUS.[19]

The coalition's offensive capability gave the theater commander a range of options for air operations. If combat erupted, the deep-mission capability would lead the counterair fight for air superiority. The coalition's long-range attack aircraft would also attack the Iraqi command and control structure, and could disrupt Iraq's ground operations. These aircraft could also strike important strategic targets in Iraq. These potential missions were formalized in the planning for Operation Desert Storm.[20]

Force Enhancement Capabilities

The initial offensive and defensive combat forces were backed by a wide range of other aircraft. The capabilities of these additional aircraft reflected state-of-the-art technology and made it possible for the field commander to complete the multitude of tasks that contribute to a successful theater campaign.[21]

Special Operations

Air Force special operations assets complemented the capabilities of other forces available to General Schwarzkopf. USAF Special Operations Forces (SOF) included MC-130 Combat Talons as well as MH-53J Pave Low and MH-60G Pave Hawk helicopters. The Army and Navy also provided helicopters to the SOF effort—MH-60 Black Hawks, CH-47 Chinooks, and SH-60 Sea Hawks. These aircraft made possible the necessary flexible and responsive insertions, extractions, and resupply of SOF units that were providing combat search and rescue (CSAR) support for aircrews operating over enemy territory. HC-130 Combat Shadow tanker and rescue aircraft extended the helicopters' range.[22]

SOF assets in the Persian Gulf region also included USAF AC-130 Specter gunships. These aircraft provided concentrated, highly accurate fire support

to ground units. However, they could be used only in relatively permissive environments because they were vulnerable to SAM fire and enemy fighters. AC-130s are particularly effective in supporting night engagements.[23]

The SOF contribution also included the EC-130E Volant Solo, which broadcasts radio and television signals into selected target areas to support the theater psychological warfare campaign. The use of aircraft in this role illustrates the capability that air power provides to a wide range of missions.[24]

Electronic Combat and SEAD

Another EC-130 variant, the EC-130H Compass Call, contributed to the electronic warfare mission—a crucial component in modern combat operations. The Compass Call aircraft provides jamming support (the disruption of enemy radio signals) for combat forces. It can inhibit enemy command and control capabilities, thus reducing the enemy's combat potential and enhancing the impact of friendly operations. The impact of such jamming is especially effective against a highly centralized structure such as that of the Iraqi military.[25]

The standoff jamming capability of the EC-130H complemented the more focused effort of the electronic warfare aircraft that penetrated unfriendly airspace along with the strike aircraft. Escort jammers degrade the ability of air defense systems to acquire and engage attacking aircraft. The USAF EF-111 Raven and the US Navy EA-6 Prowler were the primary escort jammers in Desert Storm. The coalition's combat aircraft also carried their own jamming capability as well as dispensers for chaff and flares designed to confuse enemy air defense radars and missile systems.[26]

Specialized attack aircraft also help to suppress enemy air defenses. The most specialized of those deployed into the Gulf region was the F-4G Wild Weasel, which uses specialized sensors and electronic processors to detect and locate threats to the attacking force. They then use a variety of munitions to attack the enemy defensive system. The most effective of these is the high-speed antiradiation missile (HARM). The HARM, which homes in on the radar energy emitted by enemy air defense weapons, can also be fired by a variety of other, less specialized, aircraft, like USAF F-16s and Navy F/A-18s.[27]

The defense suppression, electronic combat, and special operations forces enhanced the air power available to USCENTCOM. These assets also enhanced the combat power of the surface forces in the region. Additional important support came from the aerial tanker and transport aircraft provided by the USAF and other contributors.[28]

Aerial Refueling

The rapid positioning of such a large air combat force was made possible by the extensive use of air-to-air refueling. Although modern fighters have an impressive range, especially when carrying external fuel tanks, the distance that can be safely covered without in-flight refuelings is measured in the

hundreds of miles. Compare this to the thousands of miles required to move into the Persian Gulf region. The truly global reach of air power requires tanker support for even long-range aircraft. Additionally, the long distances from most of the bases in the region to the probable location of ground fighting and to targets inside Iraq mandated the extensive use of aerial refueling within the Gulf region itself.[29]

During Operation Desert Shield, the American tanker force supported not only the rapid deployment of hundreds of aircraft, but also extensive training operations and defensive combat air patrols (CAP) in Saudi Arabia. To meet this demand, SAC deployed 256 KC-135 Stratotankers and 46 KC-10 Extenders to the Gulf region. During Desert Shield, USAF tankers flew almost 5,000 sorties and refueled approximately 14,600 aircraft of the US Air Force, Navy, and Marine Corps, and of many other coalition countries.[30]

Aerial refueling and the inherent range and speed of combat aircraft provided an impressive and timely massing of forces. However, combat aircraft do not deploy and operate by themselves. Air combat organizations require extensive support structures, including maintenance, supply, intelligence, and command and control. These capabilities had to be deployed too, and the entire organization had to be sustained in the theater.[31]

Airlift

The transportation demands associated with Desert Shield and Desert Storm were extensive. USAF airlift into the theater (intertheater or strategic airlift) was built around the C-141 Starlifter and the C-5 Galaxy. Within the theater, 145 C-130 Hercules transports were the backbone of the tactical (intratheater) airlift system, ensuring the time-sensitive movement of critical resources and helping to reduce the effects of Saudi Arabia's limited road system.[32]

The strategic airlift operation directed by Military Airlift Command (MAC) is one of the most impressive logistical feats ever accomplished. Airlift moved most of the personnel into the region and ensured that time-sensitive material reached the right location quickly. More than 91,000 troops and 72,000 tons of cargo were moved in the first 30 days of Desert Shield. The average daily airlift effort during Desert Shield was 17,000,000 ton-miles. The ton-miles moved in six weeks equaled the 65 weeks of the Berlin Airlift in 1948-49.[33]

In addition to air units, the airlift fleet moved light ground units into the theater. These forces were important symbols of the American commitment to Saudi security. The ready brigade of the 82d Airborne Division was in Saudi Arabia within hours and the remainder of the 82d was not far behind. Marine units quickly followed, forming a Marine expeditionary brigade and a Marine expeditionary force. The airlifted Marines picked up equipment that had been stored on maritime prepositioning ships in the Indian Ocean for just such a contingency.[34]

Air power can move air and light ground forces very rapidly to the far reaches of the globe. Heavier ground units, especially armored forces with tanks, must be deployed by surface transportation. Even Air Force units are dependent on surface transportation for logistical support in sustained operations, especially for the delivery of fuel and munitions.[35]

Supporting Combat Power

Fortunately for the US forces, USCENTCOM planners had recognized the problems associated with rapid-force deployments and had prepositioned materiel in the theater. Several sites on shore provided fuel, ammunition, and equipment that would have required 1,800 airlift sorties. Additionally, considerable materiel was stored on three prepositioning ships—one in the Mediterranean Sea and two in the Indian Ocean. This logistical base amplified the combat potential of the initial Air Force units. Fortunately, no hostile action opposed the deployment into the Persian Gulf region; and the long time between the start of deployment and the beginning of combat operations greatly aided the development of support capabilities.[36]

USAF units had years of training and preparation to operate in a "bare base" environment, adding that flexibility to the operational flexibility of air power. The Air Force can deploy to, and operate from, any location having an adequate runway, a ramp structure, and a water source. Civil engineering units can build entire air bases. Many of the bases used during Operation Desert Shield were built almost from the ground up. Fortunately, the Saudi government had already constructed an extensive network of landing strips and a number of world-class main operating bases. These strips and bases were absolutely essential to the rapid buildup of air power in the region.[37]

Once the air units were established, whether on a main operating base or a bare base, USCENTCOM had to provide a support system that could sustain them. The prepositioned assets and the airlifted personnel and resources were a solid foundation, but the logistical structure had to be rapidly refined and a surface transportation network had to be established. The planners had assumed that ships would move 95 percent of the dry cargo and 90 percent of the sustaining supplies, but airlift actually delivered 15 percent of the dry cargo and 30 percent of the sustaining supplies—three times the planned amounts. Nonetheless, sealift delivered the bulk of equipment and supplies to the theater. Neither the massive deployment of Desert Shield nor the major air and surface operations of Desert Storm could have been done without sealift.[38]

Nor could the force buildup and the offensive operations have been accomplished without effective and efficient organizational structure and command and control system. This was especially true for the coalition's large air armada.

Command and Control

The USCENTCOM organization combined with periodic exercises in the area to provide a foundation for the command structure. The joint relationships between US forces were relatively clearly established, and General Schwarzkopf ensured that interservice issues would be quickly decided. The situation *was* somewhat complicated by the combined nature of the operation, however, since many countries participated in the coalition.[39]

Some of the issues were resolved by splitting the overall force structure into two parallel organizations, with General Schwarzkopf commanding the US contribution. He eventually commanded the French and British forces as well. Saudi Lt Gen Prince Khalid bin Sultan bin Abdul-Aziz commanded the Arab/Islamic forces, which were identified as the "Joint Forces." Some of the potential for problems was offset by years of training exercises, professional education exchanges, and exchange tours. The interoperability between US and other NATO members of the coalition was particularly good. However, problems were encountered in integrating the doctrine and procedures of the many diverse members of the coalition. The time between deployment and combat was used to ensure that command and control relationships and the communications networks would stand the pressures. Training exercises were conducted, and liaison teams were assigned, to ensure smooth cooperation between units.[40]

The training and cooperation were important in a number of ways. Since air power would provide important support to the frontline ground units, the procedures for getting this support and for identifying friendly and enemy forces were critical. The air commanders were especially concerned over the possibility of fratricide, or friend-on-friend engagements. Fratricide was also a potential problem in air-to-air and air defense operations.[41]

The realities of fast-paced combat, the normal fog and friction of war, and the fact that many coalition forces used equipment that was similar to that used by the Iraqi military, meant that fratricide remained a major concern throughout Desert Shield and Desert Storm. Training, an extensive liaison system, clear rules of engagement, and a strongly centralized command and control system were the keys to avoiding fratricide.[42] The success of USCENTCOM's command and control structure clearly supports the core tenet of air power theory that combat aviation must be centrally controlled.

Air Command Structure

Beginning with World War II, the US armed services have argued over the proper way to control air power. The USAF has followed the basic philosophy that a highly centralized approach allows the combat force commander to exploit the flexibility of aviation and focus its firepower on the most important targets.

Primarily because they approach war and combat differently, the other services have not supported the Air Force view. The US Navy views air power as an extension of the fleet and does not want to surrender control of its air assets to a land-based commander. The US Marine Corps views air power as an integral part of its air-ground combat team and is unwilling to surrender its flexible firepower to an outside commander. The US Army, especially at the lower and medium command levels, tends to want more air assets assigned to the direct support role. Army officers often complain that the USAF emphasis on centralized control leads to too much emphasis on deep operations rather than support for the frontline ground units.[43]

The USCENTCOM command structure and General Schwarzkopf ensured that the air resources deployed in the Persian Gulf region were centrally controlled. General Schwarzkopf assigned his USAF component commander, Lt Gen Charles Horner, to serve as his joint force air component commander (JFACC). The JFACC makes recommendations to the CINC on the use of air assets to accomplish the theater mission. The JFACC coordinates his advice with the other component commanders, but he is the senior air commander. He directs air operations in the theater, assigns missions to subordinate units, and coordinates the air assets provided by all components. In Desert Shield/Desert Storm, General Schwarzkopf also made General Horner the area air defense commander and tasked him with coordinating all air defense activities in the region.[44]

General Schwarzkopf and General Horner ensured that air power was used in a unified manner that exploited all of its advantages. General Horner also defused many of the concerns of the other services through consultations on the use of non-USAF assets. The Marines, in particular, were assured that their air assets would be available to support Marine ground units involved in combat.[45]

During Desert Shield, the JFACC helped to focus all air resources in the theater by developing coordination procedures and by conducting training to remove the problems of diverse equipment and doctrine. Within the USAF component, General Horner chose to use functional suborganizations. He created provisional air divisions for fighters, strategic aircraft (bombers and tankers), electronic combat aircraft, and airlift aircraft. The primary combat units (the wings) reported to the appropriate division commander. This arrangement allowed aircraft and mission-specific issues to be worked at the lower echelons while central headquarters provided broad operational direction.[46]

Communications

The JFACC control of USCENTCOM air assets led to a significant improvement in the application of centralized air power. It was supported by an extensive communication system that linked all air elements to the JFACC. This system, which also supported the surface forces, was heavily dependent on communications satellites. Without this use of space, coordinating the

large forces deployed during Operation Desert Shield would have been nearly impossible.[47]

Nine military satellites and 1,400 surface terminals supported USCENTCOM's extensive communication system. The satellite network included a Defense Satellite Communications System (DSCS) satellite that was moved to a new orbit to enhance its relay capability for Desert Shield/Storm. It also included leased civilian satellite channels. Early in Desert Shield, these commercial satellites provided as much as 50 percent of USCENTCOM's communications channels. The American military also purchased images from SPOT (the French commercial system) for synoptic, broad-area photographic coverage of the region.[48]

USCENTCOM's use of commercial satellites illustrates the importance of developing national aerospace capabilities. The additional support of these broader national assets was very important during Operation Desert Shield.

National Aerospace Power

The Gulf War provided an excellent example of the latent air power capabilities of the United States. Throughout Desert Shield and Desert Storm, civilian aircraft provided essential airlift support to the MAC transport effort. For the first time in its history, the US government called the Civil Reserve Air Fleet (CRAF) into action. Under the CRAF program, commercial airlines provide passenger and cargo aircraft for military use. During this first activation, the US used two phases (of three possible), adding 158 aircraft to the airlift.[49]

Civilian aircraft flew more than 5,200 missions into the theater, transporting approximately 64 percent of the troops deployed into the theater. And, although the MAC fleet handled the bulk of the cargo, wide-bodied civilian transports contributed over 20 percent of the cargo airlift.[50]

Another contribution that reflects a unique American approach to air power was the extensive use of reserve personnel and units. The Air Reserve Components (ARC) (the Air National Guard [ANG] and Air Force Reserve [AFR]) provided considerable capability to virtually all aspects of air power in Desert Shield and Desert Storm.[51]

The airlift effort depended very heavily on reserve crews and aircraft to augment regular Air Force units in both intertheater airlift and intratheater logistical operations. Airlift operations of this scope simply would not have been possible without the reserve contributions. The ARC also provided many important force support services in the Persian Gulf region. Additionally, the reserves provided combat units that helped build the forces up to the desired level. The importance of these reserve forces increased as the United States and the coalition increased their efforts to pressure Saddam Hussein and to prepare for offensive operations if necessary.[52]

Compellence

Although the invasion of Kuwait was the trigger for the extensive military buildup in the Persian Gulf region, the specific focus of the initial Desert Shield deployment was to deter further Iraqi aggression, defend Saudi Arabia if an attack occurred, and enforce the United Nations economic sanctions. These initial objectives were met by the rapid movement of American forces and the development of a strong international coalition that provided both military forces and political/psychological pressures against Iraq.

After several weeks, American commanders were confident that further aggression had been deterred and that Saudi Arabia could be successfully defended. This was an impressive success, but it did not satisfy all of the objectives, which included the liberation of Kuwait. Therefore, as Desert Shield evolved, American leaders carefully examined their ability to compel Iraq to leave Kuwait.[53]

Compellence theory is closely related to the concept of deterrence. While deterrence is oriented toward preventing an adversary's action, compellence involves applying pressure or threatening action to coerce an adversary to take a desired course of action. Like deterrence, compellence rests on the enemy's perception of one's capability and will. The US and the coalition applied pressure on Iraq with economic sanctions, military enforcement of those sanctions, the defense of Saudi Arabia, and the threat of offensive air attack if fighting broke out. Additionally, political and psychological pressures were applied through the United Nations and the various members of the coalition.

The president and his senior advisors thought that Saddam Hussein was not reacting to the diplomatic and economic pressures being applied, and that Saddam did not take the threat of coalition military action seriously. Therefore, the president ordered an expansion of US forces in the USCENTCOM region. The result was a doubling of combat power, including the doubling of USAF aircraft in the theater.

The deployment of additional air and heavy ground forces was intended to provide a strong signal to Saddam Hussein that the coalition and the United States were serious in their threat to use force. The massing of combat power enhanced the coalition's capability to conduct offensive operations if necessary. However, these new combat units placed even greater strains on the logistical system and forced airlift and sealift to continue at a maximum rate.

As the new forces arrived, they underwent indoctrination and training in joint and combined concepts and procedures. They were also integrated into the command and control structure and the offensive campaign plan. The air operation would be the opening gambit of General Schwarzkopf's campaign.

Throughout Desert Shield, planners were crafting the plan that would be used to liberate Kuwait. The air component clearly reflected the central concepts of air power theory.

Notes

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43. Horner testimony, 236, 247–48; Blackwell, 114–19, 129–31; *Triumph Without Victory,* 265–68; Cushman, 77–78; *Reaching Globally,* 11–14. For a Navy-oriented perspective of air power, see Friedman, 82–85, 128–46, 170–79.

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50. See note 48.

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Chapter 4

Planning the Storm

As soon as the president ordered the movement of US forces to Southwest Asia, military planners began to focus on how to best use those forces. The initial planning process was founded on a USCENTCOM concept outline plan and a draft of Operational Plan 1002-90. This plan was still in the concept development stage in August, but it combined with earlier 1002 plans to provide a broad framework for the planning and operations staffs. USCENTCOM had just completed an initial evaluation of the new plan in an exercise called "Internal Look 90." USCENTCOM planners adapted the established concept to fit the specific situation in the Persian Gulf region and to support the strategic, operational, and tactical goals that the president and General Schwarzkopf had established.[1]

The planning process for air operations evolved along two separate but complementary tracks. They eventually merged as the force structure expanded and the coalition prepared for offensive action to liberate Kuwait. The initial USCENTCOM plan matched the available resources with the threat of continued Iraqi aggression. This "D-day" (the start of hostilities) plan assumed that Iraq might seize the initiative and force the coalition into combat.[2]

Concurrently, planners on the Air Staff in Washington and in the USCENTCOM headquarters in Saudi Arabia developed an air campaign plan for the theater. It was designed to force Iraq out of Kuwait and reduce Iraq's military threat to the region and to American interests. Both plans reflected the core concepts of air power theory, especially the exploitation of air power's flexibility, range, speed, and concentrated firepower.[3]

Planning the Theater Defense

Tactical and operational realities combined with strategic objectives to shape the D-day plan, which was in a continuous state of flux as additional forces arrived and as intelligence reports on Iraq's capabilities and intent were revised. The D-day plan emphasized the role of air power, especially in the early days of the deployment, but it also recognized the importance of joint (air, ground, and sea) operations to halt any attack by Iraq.[4]

In the early days of Operation Desert Shield, planning was heavily weighted toward the defense of Saudi Arabia. Although the initial defensive force might have struggled in the face of an intense Iraqi assault, its presence

symbolized the US commitment and served as a deterrent warning to Iraq. USCENTCOM relied heavily on aerospace forces for reconnaissance and surveillance to reduce the probability of a surprise attack, optimize the available resources if combat erupted, and form the information base needed for offensive operations.[5]

The first task of air power was to ensure air superiority in order to prevent Iraq's use of the aerial medium for combat missions and reconnaissance. Coalition defensive counterair capabilities blended air forces with ground-based air defense artillery assets. As air power theory and US doctrine explain, the objective of air superiority was to ensure that friendly ground forces could operate without the threat of intense enemy air attack and that friendly aircraft could operate freely.[6]

General Schwarzkopf needed substantial air power, especially in the initial period of Desert Shield. For several weeks, air power was the core of any hope for a successful defense of Saudi Arabia. With air superiority, coalition forces could make effective use of their air-to-ground capability. The USAF, the US Marine Corps, and the US Navy quickly deployed air assets to provide heavy firepower to the coalition's commanders, who faced a very strong Iraqi army.[7]

The ground forces that the US initially moved to the region were very light, which made possible their remarkably fast movement to the theater but which also made them potentially vulnerable. The first Army ground unit in Saudi Arabia (a brigade from the 82d Airborne Division) was so light that it was referred to as "a speed bump in the sand." The Marine units were somewhat heavier but still not equipped to directly challenge the armor-heavy units of the Iraqi army and the Republican Guard.[8]

Air power was the equalizer. With air superiority, coalition aircraft could provide the firepower needed to blunt an Iraqi armor attack. The Marines train and are organized for such operations in their MAGTF. US Army and Air Force units also train for coordinated operations under the Army's "Air-Land Battle" doctrine. Therefore, the theater planners stressed defensive counterair and close air support (CAS) missions as well as direct attacks and interdiction missions against Iraqi field units during the initial phase of Desert Shield. Within two weeks, air power had combined with land- and sea-based capabilities to provide the coalition a reasonable defensive capability.[9]

The deep offensive missions against Iraq that would be favored under classic air power theories were not ignored in D-day planning, but the defensive mission and the initially limited resources constrained early offensive options. As the number of deployed combat aircraft grew and more long-range attack aircraft were added, the USCENTCOM D-day plan expanded to include more targets inside Iraq. The larger force also included support aircraft and defense-suppression aircraft that were critical for attacking the heavily defended targets inside Iraq. By mid-September, USCENTCOM commanders felt that they had a significant air offensive capability.[10]

The coalition's growing offensive power enhanced its ability to defeat an Iraqi attack. Deep operations would include offensive counterair missions to

reduce Iraqi offensive aircraft and missile capabilities. Additional strikes against Iraq's command and control structure and its lines of communications would disrupt and degrade Iraq's ability to direct and sustain offensive operations.[11]

The offensive component of the D-day plan was a preview of the "air campaign plan" that served as the foundation for Operation Desert Storm.

Campaign Planning

The air campaign plan can, and in the minds of many air power advocates does, stand alone as an independent military operation. However, the Desert Storm air campaign was officially described as a component of the theater campaign. Postwar assessments by senior commanders have stressed the importance of the theater campaign plan, with the air operation being an important element of the broader effort.[12]

The US military places considerable emphasis on the importance of campaign planning. The campaign plan describes "a series of related military operations aimed to accomplish a common objective, normally within a given time and space."[13] A theater campaign, which links available military forces to strategic and operational objectives, is the responsibility of the theater commander—General Schwarzkopf in the case of Operation Desert Storm.[14]

Theater campaigns are, by US definition, joint operations. In a multinational situation, the campaign is also a combined operation, integrating the capabilities of all participating countries. The theater commander designs the campaign to achieve

> sequenced and synchronized employment of all available land, sea, air, special operations, and space forces—orchestrating the employment of these forces in ways that capitalize on the synergistic effect of joint forces.[15]

This joint perspective incorporates many of the concepts found in air power theory, including the essential of air superiority and the emphasis on identifying and attacking "the enemy's strategic and operational centers of gravity."[16] Direct attacks on an enemy's centers of gravity, or vital centers, may be conducted as an independent campaign or as an integral part of a theater campaign.[17]

General Schwarzkopf made direct air attacks on Iraqi centers of gravity a critical component of his theater campaign plan. The air plan preceded the ground plan and provided direction for the rest of the theater plan. The dominant role of air power led to the common use of the term "air campaign" during and after the war.[18]

Long-standing air power theories and Air Force doctrine, including the new USAF basic doctrine manual (AFM 1-1), support the concept of an independent air campaign. And the Desert Storm air campaign plan could have been applied independently. In fact, however, it complemented the ground campaign and helped prepare the theater for surface operations.[19]

The Air Campaign Concept

The idea of an independent air campaign is tightly woven into the logic of air power theory and the doctrinal culture of the United States Air Force. The strategic offensives envisioned by theorists such as Guilio Douhet and Billy Mitchell provide the foundations of the air campaign concept, which draws further strength from theories that the Air Corps Tactical School developed in the 1930s—especially the industrial web theory. Additionally, Air Force heritage includes many experiences that have contributed to an emphasis on the potentially decisive role of air power.[20]

World War II provided considerable evidence for advocates of air power and air campaigns, even though the actual impacts of various air operations are still subject to considerable debate. The US Army Air Forces (USAAF) provided air support to joint operations in numerous theater campaigns. In fact, current US doctrine manuals present the air, land, and sea operations in the Southwest Pacific as a first-rate model of a joint campaign. Gen George C. Kenney, the air commander in this campaign, demonstrated how to use air power to its best advantage in theater operations. His air forces were critical to the success of Gen Douglas MacArthur's island-hopping campaign. In the most important of the World War II air operations, the USAAF conducted a combined bomber offensive with Britain against Germany and bombed the Japanese homeland.[21]

USAF doctrine has sustained the idea of a decisive air campaign as the foundation of victory in modern war, even though experiences in Korea and Southeast Asia failed to fully support the concept. USAF leaders and the service's doctrine continue to advocate the potentially decisive value of air power, believing the lack of success in Korea and Vietnam to be the result of artificial constraints and a failure to aggressively use the combat potential of air power.[22]

The strongest example of the independent air operations concept is the single integrated operations plan (SIOP), the US plan for a nuclear war with the Soviet Union. Nuclear war planning is a direct descendent of the theories of the Air Corps Tactical School and the experiences of the strategic bombing campaigns in World War II. Although the objective of the SIOP is deterrence, it also represents the application of classic air power theory in a strategic campaign—aggressive offensive action based on intense study of the enemy's centers of gravity and vulnerabilities. In the Gulf War, the SIOP itself was not directly transferable to USCENTCOM but much of it was visible in the offensive air campaign plan. Additionally, many of the national-level reconnaissance, surveillance, and intelligence capabilities that supported Desert Storm had been developed to support the SIOP.[23]

The USAF tactical air forces (TAF)—the theater war components—in Desert Storm did not have an air campaign concept as well defined as that found in the SIOP. Also, the Air Force advocacy of decisive strategic and operational attacks in theater warfare was softened by the operational and

tactical needs of the US Army and by the Army doctrine of AirLand Battle. TAF planning and training tended to focus on defeating deployed field forces.[24]

The TAF planners tended to think at the tactical or operational level rather than at the strategic (war winning) level. Nonetheless, the TAF community clearly embraced the emphasis on air superiority, centralized control of all air assets, and offensive air operations against deep enemy targets. USAF leaders wanted to avoid the constrained and fragmented application of air power that they had experienced in the Vietnam War.[25]

Despite the nonstrategic focus of the TAF, Air Force doctrine, training, and planning contained most of the essence of the air campaign concept, even if they were not always specifically identified in that way. The Air Force had attempted to better define and explain air power's capabilities and its potential for decisive action in various articles and in publications such as *The Air Force and U.S. National Security: Global Reach—Global Power*. Col John A. Warden III also helped focus the concept of an air campaign in an unofficial study, *The Air Campaign: Planning for Combat*.[26]

Colonel Warden's book is especially relevant to the Desert Storm air campaign because he helped develop the initial proposal that provided a framework for the planning process. *The Air Campaign* is a well-structured historical analysis of the role of air power in theater warfare. Colonel Warden stresses that the theater situation should be carefully evaluated and the relationships between the various types of combat forces should be adjusted to suit the situation. He examines the use of air power to support surface operations and the complementary and synergistic relationships between the various types of forces. He also argues that air power can be the dominant, even decisive, force in certain situations and that surface forces can be used to support air operations just as air power can be used to support surface operations.[27]

Colonel Warden emphasizes the crucial importance of air superiority in all types of theater operations. He describes the importance of exploiting offensive air operations while warning that a dialectical relationship exists between the offensive and the defensive and that defensive operations may be the necessary focus in some situations. Warden also argues that the potential decisiveness of air power rests on a proper understanding of the specific conflict, and especially on a rational assessment of both friendly and enemy capabilities, constraints, and objectives.[28]

Warden stresses the fundamental importance of truly understanding the enemy. The enemy's objectives and centers of gravity are especially important. He believes that if conditions are right and if the correct centers of gravity are identified and attacked, air power can be the war-winning force in some theaters. While he does not suggest that air power can provide victory in all situations, he does argue that the theater commander must not simply try to balance all available forces. Instead, the commander must carefully evaluate the mission, the available friendly forces, and the enemy's forces. Then he must develop a plan that exploits his own strengths and attacks the enemy's weaknesses and centers of gravity.[29]

Colonel Warden further refined "centers of gravity" by developing a model based on concentric rings, each of which represents a potential center of gravity. Although each country has a unique set of vulnerabilities and centers of gravity, Warden's methodology identifies five strategic and operational rings that represent potential targets for military attack.[30]

The model can be viewed as a "bull's-eye" target with the most important centers of gravity located at the center and the least important being on the outside. But while the innermost ring represents the most important center, attacks on the others may be required, depending on circumstances and capabilities. The theater commander must carefully analyze the various centers to develop the most effective focus for his power.[31]

The outermost ring in Colonel Warden's model is the enemy's fielded military forces. Historically, field forces have been the focus of military planning, especially campaign planning. However, Colonel Warden claims that these forces should be viewed as primarily "a means to an end." They are the shield that defends the other centers of gravity, and they are the sword that threatens one's own centers. Although Warden concludes that defeating these fielded forces will ultimately lead to victory, he argues that they should not be the automatic focus of military operations.[32]

Like the early air power theorists, Colonel Warden suggests that modern technology, most specifically air power, allows a military commander to bypass the shield and strike at the more vulnerable centers of gravity inside the outer ring. The commander may also elect to attack more than one target ring at the same time. Warden contends that traditional military thought tends to focus on fielded forces because, historically, military forces could not easily attack other centers of gravity without first engaging the enemy's combat power. Colonel Warden's central argument is that air power can directly attack or influence the much more important centers of gravity without getting bogged down in a potentially inconclusive struggle with the enemy's field forces. Further, other options, such as psychological operations or unconventional warfare, can also be used to reach the inner rings.[33]

The next ring in Warden's model represents the enemy population and its food sources. Although other air power theorists—especially Guilio Douhet—focus specifically on the population, Colonel Warden does not view this as a very promising target, in part because attacks on populations raise moral issues. Colonel Warden argues that the popular will can be attacked in selected circumstances—the North Vietnamese conducted a very successful indirect campaign against the popular will of the American people during the Vietnam War—but adds that it is a difficult objective at best.[34]

Inside the population ring is the national infrastructure, which includes the civil and military transportation systems that support both the industrial system and the military. This center of gravity includes railroads, highway systems, and air and sea transportation facilities. It also includes the facilities that move information—the civil and military command, control, and communications structure. Attacks on this ring can influence all other rings, both outside and inside its own position.[35]

The second most important ring in the Warden model is the state's key production capability. This view mirrors somewhat the traditional attacks on industrial potential advocated in early versions of air power theory. In Warden's view, industrial targets can be attacked to reduce the state's ability to sustain the war or to make the war politically and economically expensive. Specifically, Colonel Warden cites petroleum processing and electrical power generating facilities as potential centers of gravity in this ring. Attacks on key production facilities can influence outer rings and, most importantly, the critical central ring.[36]

The center ring—the most important center of gravity—is the enemy command structure. The enemy leadership is the ultimate target because it represents the brain that integrates all of the capabilities of the state and the military. The leadership decides if, when, and how to fight. It also decides when to stop fighting and what concessions will be made to end the conflict.[37]

The command structure should be directly attacked when possible. If direct attack is impossible, operationally difficult, or not likely to be effective, the leadership can be indirectly influenced through operations against the other rings. Colonel Warden considers this aspect of his theory so important that he states, "It is imperative to remember that all actions are aimed against the mind of the enemy command."[38] Attacks can also disconnect the leadership from the other rings, especially the fielded military forces. And the impact of military operations can be amplified through other instruments of national power—political, economic, and psychological—used against the enemy leadership.[39]

Colonel Warden also developed a set of concentric rings to define operational centers of gravity to help focus theater-level planning. This model is similar to the strategic construct. The critical center of gravity from the operational perspective is the theater commander because he controls whether to retreat, surrender, or attack.[40]

The first ring outside the center ring represents the war supplies that support sustained operations. The next two rings are the military infrastructure and the support personnel. The outermost ring represents the actual combat forces. As with the strategic model, Warden's theater concept stresses direct and indirect attacks on the central ring, with attacks on the outer rings designed to influence the key center of gravity—the enemy commander.[41]

To achieve the desired effects in both operational and strategic arenas, Colonel Warden strongly emphasizes that the commander must study and understand the enemy leaders, their perspectives, their objectives, and their culture. The insights gained by such study will allow the commander to identify the most important centers of gravity and determine the best ways to attack these critical targets. These targets should be at, or as close as possible to, the centermost ring of his model. He warns that attacks on seemingly appropriate targets—an industry that directly supports combat operations, for example—may be essentially irrelevant if the attacks fail to apply pressure on the leadership.[42]

Colonel Warden's model is a refinement of the approach to warfare that is found in much of air power theory. By carefully studying the military problem and identifying the most important targets, the theater commander can use air power to quickly concentrate firepower, possibly producing shock and achieving the political objectives at the lowest cost and without wasting military assets. These concepts strongly influenced the air campaign plan that evolved into Operation Desert Storm.[43]

The Desert Storm Air Campaign Plan

General Schwarzkopf quickly realized that air power was not only the key to his deterrence posture and his initial defensive capability, but that it also provided his only option for an early offensive capability against Iraq. Until heavy US ground units reached the theater, weeks and months after the deployment began, his only offensive option was air power. Even after a ground offensive was possible, General Schwarzkopf knew that intense air operations would be needed to offset Iraqi military advantages. Additionally, the geography of the region—terrain, foliage, and weather—and the structure of the Iraqi military created excellent conditions for air operations. As his own air component (CENTAF/Ninth Air Force) focused on the deployment of forces, the development of a logistical structure, and the D-day plan, General Schwarzkopf turned to the Joint Chiefs of Staff for help in designing an offensive air plan.[44]

For some military officers, this smacked of a return to the mistakes of the Southeast Asia experience when the air war was run from Washington. Some officers feared that centralized national control would once again limit the flexibility of the theater commander and his subordinates. However, this was not the case in the planning process; nor would it be the case during combat. In a challenging situation, General Schwarzkopf merely exercised his prerogative to request support.[45]

The request was routed to the Air Force for action. Within the Air Staff, Checkmate, an organization under Colonel Warden's direction, took the lead for the planning effort. Checkmate, which had begun to analyze Iraqi vulnerabilities and centers of gravity immediately after the crisis erupted, included members of various Air Force communities. As the crisis evolved, Checkmate was supported by representatives of the other services and by many other agencies in Washington. Checkmate passed the primary planning responsibility on to the theater but supported the USCENTCOM/CENTAF planners throughout Desert Shield and Desert Storm.[46]

In the theater, responsibility for the centralized planning process belonged to Lieutenant General Horner, the JFACC for USCENTCOM. General Horner selected Brig Gen Buster Glossen to lead a small planning cell that became known as "The Black Hole." Generals Horner and Glossen, with their joint planning cell (including representatives of all US armed services and the

British Royal Air Force), continuously refined the air campaign plan as more forces were added and more information was gathered. The planning cell produced a detailed plan for conducting the air campaign: the Master Attack Plan (MAP). It included Air Tasking Orders (ATO) that provided daily specific directions for all fixed-wing air operations in the theater. The MAP and ATOs ensured that the entire air effort was applied in a well-orchestrated fashion.[47]

Although some air planners envisioned the air campaign as a potentially independent solution, Generals Schwarzkopf and Horner focused on the air campaigns as an integral part of the theater campaign. However, this was an evolutionary process. The air campaign was developed independently from the ground scheme, and the final joint campaign plan was cobbled together well after the air campaign had been defined.[48]

Instant Thunder

Under Colonel John Warden's direction, Checkmate planners developed the Instant Thunder concept as a strategic and potentially war-winning offensive operation. The name of the plan was intentionally selected to stress its significant difference from the gradual escalation of the "Rolling Thunder" bombing campaign against North Vietnam. The Checkmate planners designed the Instant Thunder campaign to be "a furious and sustained air campaign to achieve the coalition's political objectives in the shortest possible time and at the least cost in life and collateral damage."[49]

General Schwarzkopf and the Chairman of the Joint Chiefs of Staff, Gen Colin L. Powell, accepted the plan as the foundation for the theater campaign to liberate Kuwait. As a strategic concept, Instant Thunder optimized US advantages and strengths—especially a high quality force with "superior personnel and training" and "vastly superior firepower and technology"—with emphasis on air power.[50] Instant Thunder also directly attacked Iraqi weaknesses while avoiding Iraqi strengths—most specifically a large army, in prepared defensive positions, with recognized expertise and extensive experience in defensive operations. The Instant Thunder concept supported US national objectives as well as the constraining objectives of minimal Iraqi casualties and the lowest possible US and coalition losses.[51]

The focus of the intense strategic campaign was the mind of Saddam Hussein and his senior leadership. The goal was coercing them to withdraw from Kuwait. Checkmate also designed the plan to reduce Iraq's ability to threaten either the stability of the region or US interests in the area. The air operations were also designed to create the conditions for a successful ground campaign if Iraq did not comply with United Nations demands. To reach these objectives, Checkmate planners established a series of target sets for the offensive operation.[52]

Air Superiority. Although air defenses are part of the fielded forces in the centers of gravity model, Instant Thunder followed the lead of all air power theory by stressing the requirement of air superiority. Instant Thunder reflected the belief that air superiority, and eventually air supremacy, is a

prerequisite for an effective, short, and intense air campaign. The campaign concept included extensive attacks on Iraq's integrated air defense system (IADS) in the initial phase. Offensive counterair and suppression of enemy air defenses (SEAD) were also important missions in this activity.[53]

The offensive plan for air supremacy included attacks on the highly centralized command and control structure that held the Iraqi air defense system together. Attacks were planned against headquarters facilities, command and control facilities, radar sites, and airfields. The strike forces also would engage and destroy Iraqi aircraft, missile launchers, and radar systems that reacted to the attacks.[54]

Air supremacy allowed all the other missions to be performed with a higher probability of success and with fewer losses. Air supremacy also directly contributed to the attacks on the minds of enemy leaders in that the unrestrained, high-intensity air operations were intended to create a feeling of great vulnerability in the Iraqi leadership. This was especially important with respect to Saddam Hussein, who had denigrated the value of air power and had placed great emphasis on and confidence in his integrated air defense system.[55]

Leadership. The strategic air campaign sought to pressure Saddam Hussein and his senior commanders into accepting the United Nations demands. The plan also had a more direct immediate objective—to "paralyze the Iraqi leadership's ability to command and control the operations of its forces both offensively and defensively."[56] Iraq's military was highly centralized and therefore very vulnerable to attacks on its command and control systems. The plan targeted major Iraqi headquarters and command facilities as well as key nodes in the civil command and control system. These attacks helped to blind the Iraqi leadership, preventing effective reactions to the air offensive and hiding the massive shift of coalition ground forces in preparation for the ground campaign. The Checkmate campaign plan also identified many other targets, the loss of which would influence the Iraqi leadership.[57]

Key Production. The Checkmate planners designed attacks on key production capabilities to reduce Iraq's short- and long-term military potential. These attacks were expected to add pressure on Saddam Hussein and his senior advisors by destroying capabilities that they valued. US national objectives also identified some specific targets, including Iraqi nuclear, biological, and chemical weapons research and production facilities.[58]

Production targets included key electrical power generating and petroleum refining facilities. Destruction of these targets would restrict the Iraqis' use of their communications and other production capabilities. Strikes against these targets were also designed to provide postwar leverage against Saddam Hussein's regime. The original concept was that these targets would be attacked in ways that would allow them to be repaired relatively quickly with outside assistance after the war. (Unfortunately, this targeting philosophy did not always reach the theater, and damage to some targets was greater than that intended in the original attack plan.) The objective was not to destroy

Iraq but to eliminate threatening capabilities and to convince Iraq to withdraw from Kuwait.[59]

Infrastructure. The Iraqi infrastructure held a slightly lower priority than the leadership, air defenses, and production facilities in the early phase, but attacks on some of the communications and information transmission systems supported the counterleadership component of the campaign. Additionally, a limited number of bridges, especially on the railroad network, were identified for attack in the strategic operation. These attacks helped to isolate the forward deployed field forces from their logistical base in central Iraq. The planners also added some bridges to the target list because they served as a conduit for parts of the Iraqi landline communications system.[60]

Air planners increased the number of bridge attacks when the plan was expanded to include an operational-level phase in the Kuwait theater of operations (KTO). The attacks on the bridges, as well as those against command and control centers, production facilities, and other point targets, exploited the precision strike capability of American and British aircraft and weapons. The emphasis on precise attacks flowed from a combination of military expediency and the direction provided by the US national leadership that the war was not being fought against the people of Iraq.[61]

Population. Although some early air power theories identified popular will as the key target in strategic operations, experience has shown this to be a difficult target. Colonel Warden pointed out the challenging nature of attacks on popular will in authoritarian regimes. Nonetheless, the people and their support for their government comprise a potentially important center of gravity in any country. Therefore, although the people of Iraq were not directly attacked, Instant Thunder attempted to use the populace to pressure Saddam Hussein.[62]

The campaign plan also included strikes against the centralized control mechanisms of the Iraqi government. While these attacks might not produce an immediate impact, they could produce doubts in the leadership over national stability and the long-term security of the state. And they were complemented by sustained operations against other targets in and near the major population centers, continuously demonstrating Iraq's vulnerability to air attack. The operational concept also included psychological warfare activities designed to amplify the impact of the air strikes and undermine Saddam Hussein's regime.[63]

Fielded Forces. The strategic air campaign plan did not directly engage the bulk of Iraqi military power. The focus was clearly on the innermost rings of the centers of gravity. However, the plan did specifically target some elements of Iraq's massive military. The national integrated air defense system was targeted for operational and tactical reasons as well as for psychological impact. The campaign plan also incorporated specific military targets that were identified in the stated US national objective of reducing the Iraqi threat to the region.[64]

The Instant Thunder concept included early strikes on Iraq's long-range offensive capabilities. Iraqi bombers, air bases, and ballistic missile launching

and support facilities were important targets. Strikes on these offensive systems would degrade Iraq's ability to attack coalition targets and reduce Iraq's postwar ability to attack other states.[65]

US senior leaders also identified the Republican Guard units in the northern KTO as a strategic center of gravity and an important target for the air campaign. These ground forces were the strong central core of Iraq's military and the designated defenders of Saddam Hussein and his regime. Attacks against the Republican Guard could weaken the will of the army and create doubts about the prospects for success in the minds of Iraqi leaders. Also, attacks against the Republican Guard units, the best Iraqi offensive forces, would reduce Iraq's ability to engage in future adventurism.[66]

Generals Schwarzkopf and Powell approved the strategic air campaign and ordered a broader effort that included more emphasis on Iraqi forces in the KTO. In part, this additional tasking represented a desire to significantly reduce the offensive potential of the Iraqi military. It also reflected doubt that the air campaign alone could force Iraq out of Kuwait. Therefore, an operational-level campaign was added to the original strategic concept. The planners developed an offensive plan to reduce the combat potential of the ground units in the KTO, add to the pressure for a withdrawal from Kuwait, and create favorable conditions for a coalition ground campaign if one were necessary.[67]

The Final Desert Storm Campaign Plan

USCENTCOM/CENTAF air planners (the Black Hole planning cell) modified the basic Checkmate plan into a more detailed campaign plan, including specific ATOs for daily operations at the start of the campaign. These planners established five basic goals, building upon the concepts of the Checkmate planners.[68]

The planners' first goal was to quickly "isolate and incapacitate" the Iraqi leadership. At the same time, they wanted to seize and maintain air supremacy. Iraq's weapons of mass destruction and its research, production, storage, delivery, and offensive military capabilities also remained priority targets. The final goal was to "render the army in the Kuwait theater of operations ineffective, causing their collapse," through interdiction and direct attacks.[69]

The Desert Storm air campaign plan sought to optimize the impact of offensive air power on Iraq and its military in four phases. Some air planners believed that coalition forces could accomplish their strategic and operational objectives with air attacks on key centers of gravity. The plan included preparation for and support of a ground campaign, however, if the air attacks were not as successful as expected.[70]

Phase I: The Strategic Air Campaign. The first phase of the theater air campaign was the intense strategic air offensive conceptualized by Checkmate and refined by the Black Hole planners. It was designed to seize air supremacy and strike a wide range of strategic centers of gravity within Iraq.

The plan envisioned seven to 10 days of dedicated strategic operations. The shock and command paralysis inflicted by the strategic air operation were expected to create the conditions of success for the other phases or, possibly, produce victory without a ground campaign. Strategic strikes would continue throughout the entire theater campaign but at a reduced level as the main emphasis shifted.[71]

Phase II: KTO SEAD Operations. The second phase was a transition from the strategic level to the operational level. Specific suppression of Iraqi air defenses in the KTO complemented the attacks on the national air defense that occurred during the first phase. After one or two days of SEAD operations, the planners expected the coalition air forces to be able to conduct relatively uninhibited attacks on targets within the KTO.[72]

Phase III: The Operational Campaign in the KTO. In the third stage, the weight of effort shifted to the Iraqi forces within the KTO. The air planners designed this phase to pressure the Iraqi command by further reducing its control capability, by threatening a significant destruction of Iraq's valued ground combat power, and by demonstrating the tactical vulnerability of Iraqi forces to superior coalition technology and firepower. Destruction of these forces would also support the US objective of reducing Iraq's postwar ability to threaten its neighbors. This phase was also considered a potential precursor to a ground campaign. Army planners viewed these attacks in the KTO as preparation of the battlefield, a doctrinal concept that includes degrading the enemy's combat potential and creating the best possible conditions for friendly ground action.[73]

The operational-level plan emphasized strikes on the forward-deployed Iraqi military. As at the strategic level, Iraq's centralized command and control structure was the focal point of the air attacks. The plan also placed considerable emphasis on destroying or preventing the use of weapons of mass destruction, on Iraq's logistical structure, and on Republican Guard units. Of the remaining forward-deployed forces, the planners emphasized the armor and artillery that were the backbone of Iraq's combat capability. General Schwarzkopf placed considerable emphasis on these capabilities and used their destruction for his decision to start the ground offensive. The plan also included tactical concepts and psychological operations that were designed to reduce the morale and fighting spirit of the Iraqi soldiers. The air planners believed that the air campaign would induce Iraq to accept the United Nations demands or, at worst, set the stage for a quick and decisive ground campaign.[74]

Phase IV: Support for the Ground Campaign. If the air campaign failed to independently achieve the strategic and operational objectives by approximately the 30-day point, the theater campaign would shift to a ground offensive. The coalition air forces would continue to perform strategic and deep theater missions during this final phase, but the weight of effort would shift to directly supporting the ground campaign. Air assets would support air-land operations across the entire theater front, offsetting any residual

firepower advantage held by Iraq and providing responsive firepower on demand for the offensive forces.[75]

The air and ground campaigns were closely integrated from the very start of combat. The theater plan used the air campaign to screen the movement of coalition ground forces through Iraq to the Republican Guard positions north of Kuwait. The strategic campaign combined with the operational campaign to ensure that Iraqi air and ground forces could not interfere with the coalition's shift.[76]

Final Adjustments

The air campaign plan used in Desert Storm was essentially the same plan that had been developed in Washington and in USCENTCOM headquarters in the fall of 1990. The plan benefitted from continuing intelligence collection and from the doubling of US forces when President Bush openly committed to offensive action to liberate Kuwait in November. These additional assets led to a revision of the original plan. None of the targets were changed, but the sequence was modified: The first three phases all began on the first day of the conflict.[77] Despite this compression, however, the campaign followed the plan to emphasize strategic operations first and shift to operational targets as the campaign developed.

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Chapter 5

Applying Air Power Theory

Air power was highly successful as a deterrent during Operation Desert Shield. However, the coalition failed to compel Iraq to withdraw from Kuwait before the United Nations (UN) deadline (15 January 1991). Consequently, the campaign to liberate Kuwait was initiated in the early morning hours of 17 January 1991.

Air power was clearly the dominant and decisive factor in the campaign. Although it did not independently achieve victory, air power was the key instrument, and it established the conditions for a quick victory in the surface campaign against the Iraqi army. Its success was based on aggressive offensive attacks that seized control of the air and damaged key strategic and operational centers of gravity.[1]

The decisive effects of the coalition's air offensive highlighted the importance of centralized control for all air assets in a theater. The JFACC ensured that the implementation of the air campaign plan was tightly focused and that the large air armada from many countries operated smoothly in a highly complex combat operation.[2]

The coalition fielded 2,430 fixed-wing aircraft, 60 percent of which were "shooters," or weapons delivery aircraft. During the 43-day air campaign, the coalition flew an average of 2,500 combat and support sorties per day. The total number of sorties for the war was 109,876, of which 65,000 were combat sorties. Coalition aircraft dropped a total of 84,200 tons of bombs on Iraqi targets.[3]

The success of the air campaign illustrated the importance of striking first and the value of rapid, concentrated firepower. Air power theory explains that taking the initiative at the start amplifies the shock effect of air strikes, thereby enhancing the prospect of seizing control of the air and quickly accomplishing strategic objectives. Desert Storm also showed that surprise and deception amplify the impact of offensive strikes.

The Iraqi leaders apparently did not appreciate the potential of air power. They seemed to think they could hold their air force as a strategic reserve. They also seemed to believe that their forces could "ride out" the air attacks with their hardened protective positions and an extensive air defense system. This emphasis on defense was a fatal mistake.[4]

The coalition's attack seemed to catch Iraq by surprise, although Saddam Hussein and his military leaders should have been alert to a possible offensive after the UN deadline passed. They were apparently unprepared, and were unable to react effectively. Perhaps the Iraqis didn't understand the situation

and could not accurately assess the likelihood of an attack, or perhaps the constraints of an authoritarian government prevented accurate but unpopular assessments from moving to the top. In any case, the coalition used deception, unexpected timing, creative tactics, and new technologies to gain surprise and multiply the shock effect of the initial blows.[5]

The opening gambit of the air campaign lasted for less than three hours, but the Iraqi military never recovered from the shock. The initial assault was intense, and the coalition's air operations maintained constant pressure on Iraq. The MAP and the ATO for the first several days called for a wide variety of weapons systems to fully exploit the potential of aerospace power. The opening attacks also illustrated the importance of the relationship between the strategic, operational, and tactical levels of war.[6]

The campaign plan provided the strategic and operational objectives, and the logic for the air offensive. The underlying concept was to exploit Iraqi vulnerabilities while emphasizing coalition advantages, especially the quality of personnel and equipment. The success of the campaign rested on the plans and skills of the combat and support forces, and on their ability to flexibly respond to the uncertainties that characterize combat. The extensive preparations of Operation Desert Shield helped to ensure tactical success and strategic victory.[7]

Deception and Final Preparations

Coalition air commanders ensured a high probability of success by conducting extensive rehearsals of the air operation and by directing intense individual training. Most of this took place outside the view of Iraq's surveillance, but some activities were intentionally shown to the Iraqis as part of the deception effort. Deception ensured surprise in the opening attacks and convinced Iraqi leaders that the main attack would focus on the Kuwait theater with ground penetrations at the Saudi-Kuwaiti border and an amphibious assault on the Kuwaiti coast.[8]

The coalition's operational security (OPSEC) and communications security (COMSEC) programs helped cloak the specifics, but the Iraqis acquired a great deal of information from the world press—including some insightful assessments by American experts, among them some retired senior military officers. Some of the published assessments were close to the actual plan, but so much information was available that the Iraqis probably could not filter out the most accurate views. Additionally, the Iraqi leaders, products of a closed society, might not have trusted any information that was readily available in the press. The coalition further compounded the Iraqis' perceptual problem by selectively releasing information to the press and conducting highly visible training activities.[9]

Those training and defensive operations that were conducted in sight of the Iraqis were designed to prevent them from identifying a pending attack or

determining the specific nature of the planned assault. The broad operating patterns that were established, especially the surveillance and air defense patrols, served as a facade for the attack forces. The Iraqis would see what they expected to see, right up to the very first shots of the war. By the time the first blows landed, it would be too late for them to react effectively. When the air campaign began, Iraqi surprise was absolute.[10]

The Initial Phase

On the night of 17 January 1991, prior to H hour (time of the planned attack, 0300 local time), all the Iraqi military saw were the standard orbits of the airborne warning and control system (AWACS—E-2 and E-3) aircraft, reconnaissance platforms (such as the TR-1 and RC-135), aerial refueling tracks, and the air defense combat air patrols. A strike force of almost 700 combat aircraft supported by some 160 aerial tankers formed behind this nonthreatening front. The coalition used a combination of tactical finesse and advanced technologies to gain surprise, seize the initiative, and establish the foundation of success for the rest of the air campaign.[11]

The First Blows

A joint Army-Air Force helicopter team (Task Force Normandy) conducted the initial strikes on Iraqi targets. USAF special operations MH-53J Pave Lows used their accurate low-level navigation capability to guide an attack force of Army AH-64 Apaches to two Iraqi early warning (EW) radar sites. The helicopters were not detected until the attack actually began.[12]

The Apaches destroyed the radar facilities 22 minutes before H hour (termed H-22), a timing that was based on the estimated time that the Iraqis' radar network could detect the coalition strike force as it moved toward the border. The Apache strikes opened a hole in the Iraqis' IADS, reducing their ability to detect, identify, and respond to the coalition attack. These helicopter attacks were quickly followed by strikes from a wide range of other weapons systems, causing disintegration of Iraq's command, control, and communications (C^3) capabilities and beginning the destruction of strategic targets.[13]

Well before Task Force Normandy started the air offensive, B-52 strike aircraft had been launched from the continental United States.

Intercontinental Strikes

At 0635 on 16 January 1991, seven B-52 bombers took off from Barksdale Air Force Base, Louisiana, to participate in the first wave of Operation Desert Storm. They flew a 35-hour, 14,000-mile combat mission—the longest air combat mission in history. Later, other B-52s from the CONUS would bomb Iraqi targets before landing at airfields in the region to become part of the coalition bomber force.[14]

The initial intercontinental B-52 strike force carried 39 conventional air-launched cruise missiles (ALCM), 35 of which were launched against targets in Iraq. The cruise missiles flew at low altitudes, making detection and defense by Iraq's IADS unlikely. The ALCM's sophisticated guidance package, including the satellite-based global positioning system (GPS), allowed accurate strikes on eight "high-priority targets," including military communications nodes and electrical generation/distribution facilities.[15]

Sea-Based Missiles

The B-52 volley complemented a large cruise missile strike launched from US Navy warships. The first of the Tomahawk land-attack missiles (TLAM) was launched at H-90, an hour-and-a-half before the formal start of the air campaign. The first wave of 54 TLAMs was followed by another 62 during the first 24 hours and 100 more during the second day of the air campaign. By the end of the war, 16 surface ships and two submarines had fired a total of 288 TLAMs.[16]

Like the ALCMs, the low-flying, highly accurate TLAMs complemented the manned aircraft strikes against high-value targets. After the first wave, the TLAM sorties were flown mostly during daylight hours to maintain pressure on heavily defended targets that required precision attacks. These targets were normally attacked by manned aircraft only at night.[17]

Stealth Attack

The F-117A stealth fighter joined the Apache helicopters and cruise missiles in the opening salvo. Essentially invisible or untrackable on Iraqi radars, the first stealth fighters were well inside Iraq before the two EW radar sites were destroyed. The first F-117 laser-guided bomb struck an air defense control center at H-9 minutes.[18]

A total of 30 F-117s participated in the first wave. Their targets were primarily hardened air defense operations centers and key national command and control facilities in the Baghdad area. The F-117's precision attack capability allowed extremely effective strikes against critical targets without excessive collateral damage to surrounding civil structures.[19]

The F-117 was the only piloted system used against targets within Baghdad. The opening minutes of the ALCM, TLAM, and stealth fighter assault stunned the Iraqis, disabled their national command structure, started the destruction of strategic targets, and enhanced the ability of conventional fighters and bombers to operate inside Iraq.[20]

Defense Suppression and Electronic Combat

The initial strikes were followed by a wide array of attacks that further degraded Iraq's defense structure. The main strike forces continued to bomb key nodes in the air defense command and control system for several days and then reattacked these targets periodically throughout the campaign to ensure that the damaged systems were not reconstituted.[21]

Disruption of the IADS control structure significantly reduced the effectiveness of Iraqi air defenses, but impressive numbers of SAM launchers and massive AAA concentrations still presented a considerable threat. Coalition aircraft protected themselves with defensive tactics, self-protection jamming pods, and dispensers for chaff and flares. Iraq's air defenses were also countered by strike force operations that integrated attack aircraft, air-to-air fighter escorts, Wild Weasel aircraft, electronic warfare aircraft, and, at times, reconnaissance aircraft. Attack aircraft survivability was enhanced through a well-planned combination of electronic combat measures, direct attacks on air defense weapons systems, deception, and tactics.[22]

Airborne jamming platforms limited the ability of ground-based air defenses to track and engage the offensive forces. Some jammers (EF-111s and EA-6s) provided close escort early in the campaign and area jamming support as the ground-based air defense threat declined. Other systems, including the EC-130, jammed Iraqi radar and communications links from standoff positions outside the defended areas.[23]

The ground-based threats that used radar guidance were attacked by antiradiation missiles (ARM—specifically HARM and ALARM) that homed in on the radars. These attacks were conducted by a variety of aircraft, the USAF's Wild Weasel providing the most specialized capability. The air assault also used a variety of tactics, including Navy and Marine tactical air-launched decoys (TALD) and Air Force ground-launched decoys (BQM-74C) to confuse the Iraqis and provoke premature reactions.[24]

The SEAD quickly reduced the threat from radar-guided missiles and forced the Iraqis into ineffectual backup modes of operation. After Iraqi radar operators virtually halted emissions, the SEAD effort began to attack undamaged air defense sites that could still threaten coalition aircraft. The ground forces supported the SEAD campaign with artillery and rocket fire, and with long-range strikes by the Army tactical missile system (ATACMS) against radar and SAM sites. The SEAD effort was so successful that only 10 coalition aircraft were shot down by SAMs, although the Iraqi defenders fired thousands of missiles. The disruption of Iraq's SAM capability improved the survivability of strike packages and allowed coalition planners to modify tactics as the campaign evolved.[25]

Most of the initial strike missions were flown at very low altitude—often 200 feet or below. Even the B-52 bombers flew at very low altitudes during the opening few nights of the war. These tactics minimized the ability of Iraqi radars to acquire and track the attacking aircraft. Once the radar-controlled threats were substantially removed, the attack aircraft transitioned to medium and high altitudes to reduce the threat from AAA pieces and short-range infrared-guided (heat seeking) SAMs. Barrage fire—the massed firing of unaimed AAA into an area of the sky—posed a serious threat to coalition aircraft, but medium-altitude attacks kept them out of the range of most AAA weapons. The medium-altitude tactics were possible because the coalition's offensive counterair (OCA) operations were successful.[26]

Offensive Counterair Operations

Offensive counterair operations were extremely important in the initial phase of the air campaign, helping to ensure coalition control of the air from the opening minutes of the war. Control of the air allowed coalition air forces to perform their missions uninhibited by enemy aircraft. It also prevented the Iraqi air force from effectively performing defensive, offensive, or even support missions.[27]

Coalition attacks on the IADS C^3 nodes crippled Iraq's air defense fighter force. The initial strikes against air defense operations and control centers removed Iraq's ability to perform ground-controlled interceptions (GCI)—and Iraqi pilots were trained in the Soviet style, which placed almost complete reliance on tight ground control during intercept operations. The Iraqi air force did launch a small number of sorties—approximately 30 sorties per day for the first week of the war—but, without GCI direction, they were no threat to the coalition strike forces.[28]

Coalition fighter pilots aggressively engaged all airborne Iraqi aircraft that came within range of their weapons, quickly disposing of the few Iraqi fighters that attempted to intercept the strike forces. Many Iraqi pilots declined combat, returning to the safety of their bases when coalition fighters appeared. But coalition pilots were able to force a few Iraqis into air-to-air combat and the Iraqi pilots always lost. Coalition fighters shot down a total of 35 Iraqi aircraft with no coalition losses.[29]

The coalition had the advantages of generally superior aircraft and pilots who were capable of aggressive independent air engagements. Additionally, while the Iraqi air force was blinded by the opening blows of the air campaign, coalition pilots received highly accurate radar information, threat warnings, and intercept direction. Also, AWACS air controllers organized the many complex strike packages and coordinated the numerous aerial refueling tracks.[30]

The Iraqi military commanders seemed to understand that their pilots could not effectively challenge the coalition air assault for there were very few Iraqi air defense sorties. The low number of sorties was also influenced by coalition attacks on Iraqi airfields. Air bases are key centers of gravity for air forces, but combat air bases have been built to survive intense air attacks since the highly successful preemptive strikes by the Israeli air force at the start of the 1967 Arab-Israeli War. Key capabilities are protected by active air defenses, hardening, dispersal, and redundancy. Airfields are also designed so that well-trained personnel can quickly restore the base's operational capability after an attack. The Iraqi air bases were some of the best protected and most survivable in the world.[31]

In air power theory, the enemy's air force is most vulnerable when it is concentrated at its bases. Attacks on air bases may also force the enemy to fight in the air, giving attackers the chance to destroy both aircraft and pilots in aerial combat. Additionally, airfield attacks force the enemy to put considerable effort into defending and reconstituting the base and its valuable air assets.[32]

Well-designed, modern airfields present many difficulties to the attackers, however, and air planners often forego attempts to eliminate them. Rather, attacks are designed to reduce the adversary's ability to generate significant numbers of sorties from the base. When possible, attacks on air bases are directed against single points of vulnerability, especially in the supply or maintenance support infrastructure. Airfield attacks may also strike runways, but most air forces practice rapid runway repair procedures that can quickly restore a minimal, usable segment of the runway to operational status. Modern military airfields are not easy to completely close down.[33]

Coalition attacks on Iraqi airfields included strikes on critical facilities and on the runways. However, extensive hardening and the large size of the Iraqi bases made them very difficult targets. Coalition planners focused many of the early airfield attacks on the taxiways that linked the hardened aircraft shelters (HAS) to the runways. The bombs and specialized concrete-busting weapons (such as the Royal Air Force JP-233) were complemented by antipersonnel mines and time-delayed bombs that discouraged repair operations. These strikes limited the ability of the Iraqis to launch aircraft.[34]

In addition to restricting Iraqi air defense forces, the coalition OCA strikes severely damaged Iraq's offensive air capability. The opening phase of the air campaign included heavy attacks on offensive aircraft bases and fixed surface-to-surface missile (SSM) launch sites. When offensive aircraft were found in the open, coalition attack aircraft were quickly vectored to the site and the threatening aircraft were destroyed before they could take off. Coalition forces were never successfully attacked by enemy aircraft.[35]

The only viable Iraqi offensive capability was the mobile SSM force. The Iraqi variants of the Soviet Scud (its NATO nickname) SSM demonstrated the potential impact of even a very limited offensive aerospace capability. Nonetheless, OCA and SEAD operations combined with the initial attacks on strategic targets to ensure the broader success of the entire air campaign and to provide the foundation for success in Desert Storm.[36]

The Initial Phase—Foundations of Victory

The complete tactical surprise and the intensity of the coalition's initial strikes overwhelmed and stunned the Iraqi military. By five minutes after H hour (H+5), the air campaign had struck 20 critical targets in the Baghdad area alone. By H+60, an additional 25 targets had been hit in the Baghdad area: air defense and C^3 nodes; military and governmental headquarters facilities; electrical facilities; petroleum, oil, and lubricants (POL) production and distribution capabilities; and production plants for weapons of mass destruction—nuclear, biological, and chemical (NBC) weapons. These attacks were complemented by strikes on high-value targets throughout the country.[37]

The second wave of coalition assault forces hit Iraqi targets at daybreak of the first day, sustaining the momentum established by the initial wave. Strikes against strategic targets throughout Iraq were continued, and air

operations expanded into the KTO. These theater missions began to suppress the extensive air defenses associated with the Iraqi ground forces. They also attacked Iraqi military forces in the KTO, emphasizing the C^3 structure, the logistical system, and critical combat equipment such as tanks and artillery.[38]

The third wave of the first day struck Iraq at nightfall, sustaining the pressure on Iraqi IADS and strategic targets. Additionally, B-52s began to attack the Republican Guard units in the northern part of the KTO. At the end of the first day, the coalition had flown 1,300 combat sorties. For the campaign, coalition air forces flew an average of 2,500 combat and support sorties each day.[39]

On the second night, the government of Turkey allowed joint task force (JTF) Proven Force to begin operations against Iraq from Incirlik Air Base. JTF Proven Force had easier access to the more northern targets, complicating the Iraqi defensive effort and preventing a shift of Iraqi resources to the south.[40]

During the second day, the coalition settled into the pattern of around-the-clock operations that it sustained for the entire campaign. These continuous operations represented the merging of aviation capabilities with the long-held promise of air power theory. Sustained and highly effective night operations set a new standard for air operations, removing darkness as a sanctuary from effective air attack. These air operations also showcased the highly accurate attack capabilities of precision guided munitions (PGM), especially cruise missiles and laser-guided bombs (LGB). These capabilities allowed the coalition to effectively attack high-value and high-payoff targets with limited damage to surrounding structures. The focused attacks allowed air power to have a strategic and decisive impact on the war.[41]

During his postwar debrief for the press, Gen Merrill McPeak, USAF chief of staff, noted that we (the coalition) "took the initiative at the beginning and we held it throughout the rest of the war." He opined that "In essence, the issue was decided in the first few hours of the engagement." But, while the general pattern for the campaign was established by the initial attacks, the coalition maintained the effort and built on the effects created by the opening blows.[42]

The Strategic Campaign

The weight of effort was initially heavily focused on strategic targets, with approximately 1,200 strategic sorties per day in the early days of the air campaign. The focus gradually shifted toward the KTO as the war evolved, but the strategic effort remained above 200 sorties per day until just prior to the start of the ground campaign when the air effort shifted to preparing the theater for surface operations. The 18,276 strategic attack sorties flown in the war were highly successful. They accomplished the air campaign's objectives and destroyed the critical elements of 12 target sets.[43]

Air Campaign Objectives

The objectives for the air campaign were designed to produce a decisive impact on Iraq and its military. The plan stressed the effects on Iraqi leaders at strategic and operational levels. The specific objectives for the air campaign were:

- Gain and maintain air supremacy to permit unhindered air operations
- Isolate and incapacitate the Iraqi regime
- Destroy Iraq's NBC warfare capability
- Eliminate Iraq's offensive military capability by destroying major portions of key military production, infrastructure, and power projection capabilities
- Render the Iraqi army units in Kuwait ineffective, causing their collapse (to include Republican Guard units in the KTO)[44]

Air Campaign Target Sets

The target sets established by the coalition planners were:

- Leadership command facilities
- Electrical production facilities that powered military systems
- C^3 nodes
- Strategic and tactical integrated air defense systems
- Air forces and airfields
- Nuclear, chemical, and biological weapons research and production facilities
- Scud production and storage facilities
- Naval forces and support facilities
- Oil refining and distribution facilities (as opposed to long-term oil production capability)
- Railroads and bridges connecting Iraqi military forces with logistical support centers
- Iraqi military units, to include Republican Guard forces in the KTO
- Military storage sites[45]

The central role of air operations in the Gulf War illustrates the continuing relevance of many aspects of air power theory, including the importance of air superiority and the potentially decisive role of air power in modern warfare. This is not to say that air power won the war alone—only that the air campaign was the key to victory.[46]

Control of the Air

The almost total disruption of the Iraqi IADS established de facto air superiority for the coalition in the opening minutes of the war. Coalition forces claimed air superiority by day two and air supremacy after 10 days, allowing them to sustain the strategic air campaign while preparing for the ground campaign and the liberation of Kuwait.[47]

Although the coalition easily seized control of the air, the bulk of Iraq's Air Force remained undamaged in the 594 hardened aircraft shelters at major bases throughout the country. Coalition commanders worried that Iraq could use these aircraft to launch a large-scale surprise air raid. Such a raid might saturate coalition air defenses and inflict damage on air bases or large logistical concentrations. The military impact of such a raid would likely be limited, but the political and psychological effects could be severe, especially if the attack used chemical or biological weapons. American leaders feared the effect of an air raid directed against Israel.[48]

Coalition leaders referred to the potential Iraqi air raid as an "aerial Tet," recalling the 1968 Vietcong and North Vietnamese offensive in South Vietnam. The Tet Offensive was a military disaster for the attackers, but it had a tremendous negative effect on the will of the American people to support the war. Tet contributed to and amplified a growing domestic political backlash in the United States that eventually led to US withdrawal and North Vietnamese victory. Concern over a potential aerial Tet demonstrates an awareness of the important linkage between the military, the government, and the will of the people.[49]

Coalition leaders did not want the Iraqis to maintain a latent air threat in their HAS system. Therefore, on 23 January, the OCA effort shifted from reducing air base operability to destroying aircraft in their shelters. Precision strikes eventually destroyed or heavily damaged 375 (63 percent) of the shelters. Airfield attacks comprised 17 percent of the total strategic sorties of the air campaign.[50]

After three days of coalition attacks on Iraq's HAS system, the Iraqi air force began an exodus to internment in Iran, apparently hoping to save a portion of their inventory. Eighty aircraft fled to Iran in three days, and the coalition responded with barrier CAPs along the border. These OCA patrols shot down several Iraqi aircraft, quickly ending the cross-border flights. A total of 109 Iraqi aircraft, however, had reached Iran safely.[51]

When the coalition closed the exodus option, the Iraqis began to remove their aircraft from the shelters and disperse them in camouflaged positions near the airfields. Many of them were parked in residential areas and near important cultural or archaeological sites. The Iraqis understood that the coalition rules of engagement (ROE) would prevent attacks on aircraft in these locations. This dispersal saved many Iraqi aircraft from destruction, but it also removed them from combat and allowed the coalition to monitor their status.[52]

The coalition's OCA operations removed the offensive threat of Iraqi aircraft; there were no successful offensive attacks on coalition forces. One two-ship formation did attempt a raid early in the war, but it was intercepted and destroyed by AWACS-directed Saudi F-15s that were part of the defensive counterair (DCA) plan to protect the coalition's surface forces and rear area. The DCA system incorporated AWACS, ground-based radars, airborne fighter CAPs, rapid response fighters on ground or aircraft carrier alert, and ground-based air defense missiles and guns.

Extensive DCA forces were maintained as insurance against an Iraqi desperation attack.[53]

The Iraqi air force was completely removed as a factor in the war. Having had more than 750 combat aircraft in its inventory at the start of the air campaign, Iraq had less than 300 aircraft and only a marginal combat capability at the end of the war. The final official assessment estimated that "109 Iraqi combat fixed-wing aircraft flew to Iran; 151 were destroyed on the ground; 33 were shot down by coalition fighter aircraft; and 31 were captured or destroyed by ground forces." The world's sixth largest air force was not a factor in the war's outcome.[54]

As part of its efforts to control the air and limit the enemy's ability to use the aerospace medium, the coalition's strategic campaign also had to deal with Iraqi surface-to-surface missiles. The anti-Scud experience of Desert Storm highlighted the inherent offensive nature of aerospace operations, but it also underlined the complementary value of defensive capabilities.

Anti-Scud Operations

The coalition followed the classic air power theory model of preempting the enemy's offensive capability. Like the Iraqi offensive aircraft and airfields, the fixed launch sites for SSMs were attacked during the first day of the coalition offensive. Additionally, Scud production and storage facilities were struck by day three of the air campaign. However, the mobile SSM launchers created the biggest challenge of the war for the coalition and illustrated the dominance of offensive operations in the use of aerospace power.[55]

The attacks on fixed launch sites and production facilities were considered highly successful during the war, but postwar assessments by UN inspection teams indicated that much of Iraq's key production capability had been moved before the war and could have been used to reconstitute the missile force after the war. Nonetheless, these strategic attacks reduced the immediate threat of the Iraqi missile systems.[56]

On the second day of the war, the Iraqi military began to use their relatively limited SSM force in a strategic bombing campaign of their own. These attacks by Scud missiles lacked precision, however, and could not achieve the specific military results that the coalition air attacks could produce. Nevertheless, these limited missile strikes—never exceeding 10 in a day and totalling 88 launches (42 toward Israel and 46 toward the coalition)—represented a significant strategic threat.[57]

The inaccurate Scuds were often referred to as "militarily insignificant," reflecting the limited tactical impact of the strikes on the coalition military. However, this notion runs counter to the reality of a direct linkage between politics and military operations. The Scuds posed the same kind of threat to the will of the coalition as the "aerial Tet," and the possibility of chemical or biological warheads amplified the psychological impact of the missiles. The greatest threat was that strikes on Israel would provoke a reaction and lead

to the disintegration of the coalition. Given these considerations, the Scuds were certainly a significant strategic military concern.[58]

Aerospace Defensive Operations. The most visible reaction to the Scud launches was the deployment of Patriot missile batteries on the Saudi Peninsula and in Israel. Although designed as an antiaircraft missile, modified Patriots had a limited antiballistic missile capability. They were part of the earliest US deployments because of the recognized potential of Iraqi SSM attacks. US strategic airlift aircraft quickly deployed Patriots to Israel in an effort to keep Israel out of the war. Patriot operators were supported by an extensive C^3 system that the US established and by space systems that provided warning and early tracking data on the Iraqi missiles.[59]

The early, highly visible successes of the Patriots had a very positive psychological effect on the coalition's military members and on civilians in both target areas. The calming effect on the Israeli populace and political leadership helped keep Israel out of the war. Although postwar assessments indicate that the Patriots were not as successful as initially thought, the psychological impact of the Patriot operations illustrates an important aspect of defensive capabilities. Aerospace defenses can degrade the impact of an offensive strike and help to ensure that both military and civilian morale holds steady until one's own offensive operations gain control of the situation. However, the Iraqi Scuds did illustrate the potential of even limited aerospace offensive capabilities.[60]

Coalition dominance of the Iraqi IADS demonstrates the problems inherent in relying on a defensive posture alone. In Desert Storm, the ultimate solution to the Scud threat was sustained offensive action against missile launchers and the support system that was sustaining the Scud campaign.[61]

Offensive Countermissile Operations. The offensive counter-Scud effort was made difficult by the mobile nature of the threat. By the end of the war, however, the coalition had improved its tactical intelligence operation and devised a combination of tactics that significantly degraded the Iraqi SSM capability. Iraqi missile activity declined from an average of five Scud launches per day in the first 10 days of combat to an average of one per day for the remainder of the war. On the day before the war ended, coalition air strikes, guided by reports from special operations forces, preempted a large Scud barrage that was apparently designed to swamp the Israeli Patriot missile batteries and draw Israel into the war.[62]

Fifteen percent of the coalition's strategic sorties were flown against SSM targets, an indication of the challenge and the importance of removing the Scud threat. The counterair missions and counter-Scud operations were designed to create the underlying conditions for controlling the aerospace environment. The air campaign built on their success with attacks on the other strategic targets. The planners expected their greatest payoff to come from attacks on leadership and C^3 targets.[63]

National Command and Control

Command and control—the brain and nervous system of the military—is the most critical component of any large military force. The highly centralized nature of Iraq's government and military forces made them particularly reliant on effective command and control and particularly vulnerable to highly focused air attacks. The coalition's air campaign plan recognized this fact and identified the Iraqi leadership as a key center of gravity for the air offensive. But the Iraqi military also realized its potential vulnerabilities and had developed an extensive hardened and redundant command and control structure.[64]

Effective strikes on command and control targets were crucial to accomplishing the campaign objective of isolating the senior leaders. And although the percentage of strategic sorties dedicated to leadership command facilities (2 percent) and C^3 nodes (3 percent) was small, they had a significant impact on Saddam Hussein's regime and its ability to wage war. Highly successful precision strikes on command and control targets from the opening minutes of the air campaign shocked Iraq's leaders and significantly reduced their ability to direct a response to the coalition's offensive.[65]

National Command Facilities. Strikes on command bunkers and headquarters buildings quickly reduced Saddam Hussein's ability to maintain control of the military and the people of Iraq. National control elements continued to function, but at considerably lower levels of efficiency. Given the tight-reigned approach to leadership in Iraq, this efficiency reduction quickly resulted in greatly impaired operations throughout the government and the military.[66]

Iraqi leaders were forced to use less effective alternate facilities—even mobile command centers—to direct their military operations and to run the country. They received limited information, were vulnerable to coalition air attacks, and were forced to use radio communications links that provided location information and potential intelligence to the coalition.[67]

Command, Control, and Communications Nodes. Information is the key to success in modern warfare, and the destruction of Iraq's C^3 nodes restricted the flow of information to senior national leaders. The top echelons of Iraqi command were partially blinded in the opening phase of the war, a situation made worse by the lack of any reconnaissance capability due to the coalition's control of the air.[68]

Coalition attacks on the C^3 structure also limited, but did not eliminate, the ability of Iraqi leaders to control their field forces and their internal security forces. They were in a very difficult position; they had already lost the initiative, and the degradation of their command structure forced them to react without a clear picture of what the coalition was doing. And coalition strikes on Iraqi command and control targets left them with imperfect and uncertain control channels to their forces, greatly intensifying the "fog" that surrounds military operations in war.[69]

The Iraqis were able to use their extensive alternate communications channels, but these were less effective than their normal secure lines—especially their fiber-optic system. The backup communications links were more vulnerable to interception by coalition intelligence collectors. The reduced communications capability also severely constrained Saddam Hussein's ability to communicate with the Iraqi people and with the outside world. This restricted his ability to manipulate opinions and control the Iraqi populace, potentially undercutting his security.[70]

Air supremacy—including reduced Iraqi air defenses and elimination of the Iraqi offensive threat—and degradation of Iraq's command and control capabilities were the key early objectives of the strategic bombing offensive. The success of the early attacks was reinforced throughout the war by reattacks that precluded reconstitution. Strategic operations expanded rapidly to other targets to extend the shock and isolation of the senior leaders, induce an overall command paralysis, and reduce the short- and long-term military potential of Iraq. Especially important targets for these expanded strategic strikes were the Iraqi weapons of mass destruction—nuclear, chemical, and biological weapons.[71]

Nuclear, Chemical, and Biological Capabilities

The coalition viewed the Iraqi NBC capabilities as a threat to regional security and, indeed, to global security. Even before the start of the war, the coalition waged an aggressive political and psychological campaign to discourage the Iraqi use of weapons of mass destruction. In the end, Saddam appeared to have been deterred from using his terror weapons. The coalition could not count on his restraint, however, and conducted an aggressive campaign against all aspects of his NBC capabilities.[72]

NBC research and production facilities were struck by 5 percent of the strategic campaign sorties. Delivery systems associated with chemical warfare (CW) and biological warfare (BW) were struck during both the strategic offensive and the air operations in the KTO. Both air operations also emphasized strikes on storage facilities for CW and BW weapons. On several occasions, the coalition redirected missions from previously planned targets to locations where intelligence indicated that Iraq was preparing for CW operations. These preemptive attacks apparently removed the specific capabilities before they could be used.[73]

The coalition's attacks on NBC targets were highly successful, although postwar intelligence and UN inspection teams revealed that prewar and wartime intelligence had missed significant portions of Iraq's research and development programs. This discovery illustrates the problems encountered in relying on technological collection systems—"national technical means"—for intelligence. In fact, the entire strategic campaign highlights the need for good intelligence in any bombing campaign.[74]

Despite the coalition's intelligence shortfalls, however, Iraq's BW program was severely damaged and its research and production facilities were

rendered useless. Coalition attacks also destroyed at least three-fourths of Iraq's CW production capability and heavily damaged other aspects of the program. The strikes on known nuclear research and development facilities inflicted significant damage, but postwar inspections revealed capabilities not previously known.[75]

Energy Targets

The coalition attacked electricity and oil production and distribution systems to reduce Iraq's ability to sustain combat operations. These types of targets have historically been the focus of strategic bombing concepts. In the case of the coalition's air campaign, they were integrated into a broader set of targets to create a synergistic effect and substantially degrade Iraq's war-making potential.[76]

Energy targets are vulnerable to the precision attack capability of modern air forces. The coalition planned to exploit this precision attack ability. Attacks on energy targets were designed to disrupt the production and distribution systems in such ways that they could be rapidly repaired, with outside help, after the war. In concept, this would allow the coalition to maintain leverage on Iraq even after the end of hostilities. Unfortunately, as the targeting process passed to the combat units, some of the highly selective aspects of the original plan were lost—and there was more extensive damage to the power generation plants than had been intended.[77]

Electric Power. Only 1 percent of the strategic sorties hit electrical power targets, but the impact of these strikes was significant. Baghdad's electricity was taken out in the first hours of the air campaign and was not restored until after the war ended. These attacks forced the military and the government to use backup power sources. The disruption of electrical power also hampered industrial activities, especially in critical areas such as NBC weapons production.[78]

Oil Targets. The second portion of the counterenergy bombing effort disrupted Iraq's ability to refine and distribute oil products. Three percent of the coalition's strategic sorties damaged approximately 80 percent of Iraq's refining capacity and forced the Iraqis to completely shut down their production system. The reduced availability of POL complicated Iraq's logistical efforts to support its field forces in the KTO.[79]

The Logistical System

The attacks on oil system targets added to the pressures imposed by other strategic air attacks on the Iraqi logistical system. These strikes undercut Iraq's ability to sustain the combat potential of its large army in the KTO. This part of strategic targeting included military production facilities that were not included in other categories, as well as traditional interdiction targets such as military storage sites and railroad and highway bridges. The coalition directed 15 percent of its strategic sorties against production and storage facilities and 4 percent against railroads and bridges.[80]

The strategic interdiction effort destroyed or damaged three-fourths of the bridges between the logistical heart of central Iraq and the combat units in the KTO. These interdiction targets also underscored the close relationship between the strategic portion of the air campaign and the operational portion that focused on the Iraqi combat forces in the KTO.[81]

The synergistic effects of attacks on various strategic targets severely constrained Iraq's ability to support sustained combat operations. These effects were designed to influence the Iraqi leaders by showing them the dominance of coalition air forces and creating feelings of vulnerability. The air planners hoped that the air campaign would force a withdrawal from Kuwait without ground combat. Part of the pressure included direct attacks on Iraqi combat forces. In addition to contributing strategic pressure, these attacks degraded Iraqi combat power and set the stage for a ground battle if one should be needed.[82]

Beyond the strategic target sets of the IADS, the air force, and Scuds, two other aspects of the Iraqi military were considered important enough to be strategic targets. These were the Iraqi navy and the Republican Guard.[83]

Naval Forces

The Iraqi navy was given strategic status because it could threaten coalition naval operations in the Persian Gulf and gain a psychological victory from any successful attack. Of special importance to the coalition were US carrier operations in very constrained waterways and the maritime logistical lifeline of the coalition's forces. Additionally, the Iraqi navy, especially its antiship missile and mine-laying capabilities, had to be destroyed to allow coalition operations in the extreme northern end of the Persian Gulf. Removing Iraq's naval threat allowed sea-based support for the ground offensive and cleared the way for a potential amphibious landing.[84]

Two percent of the strategic sorties were flown against naval targets. Most of Iraq's combat vessels and land-based missile systems were destroyed by these attacks. Coalition air strikes had eliminated the offensive potential of the Iraqi navy by early February.[85]

Republican Guard

The air campaign plan identified the Republican Guard as one of the Iraqi centers of gravity. These forces symbolized the Saddam Hussein regime and were the best trained and equipped units in the Iraqi military. They were positioned as a theater reserve around the northern Iraq-Kuwait border. The coalition directed more air strikes—5,646 sorties, 31 percent of the strategic total—against the Republican Guard than against any other strategic target set. This air assault reduced the combat power of these elite units, and it kept them under constant bombing pressure in an effort to reduce their morale and their will to fight. After the first day, coalition aircraft, often B-52s, struck the Republican Guard at least once every three to four hours.[86]

Although the overall strength of the Republican Guard was reduced by the bombing, some units were still combat-capable when the ground war started. Some of these engaged the US Army forces that enveloped the Iraqi positions in the KTO, but experienced no success. Along with control of the air, disruption of the C^3 structure, and isolation of the KTO, attacks on the elite heart of the Iraqi military were intended to make the Iraqi leaders feel that the combat situation was totally out of their control and that the cost of remaining in Kuwait was too high. However, in spite of the intense bombing, the Iraqi leaders did not bend. Therefore, the coalition increasingly shifted the focus of its bombing effort to the Iraqi combat forces in the KTO.[87]

Theater Air Operations

The coalition air attacks in the KTO complemented the strategic campaign by applying additional pressure on Iraq's large military structure. The constant bombing amplified the problems that the senior leaders faced in maintaining a viable military force. Direct attacks on military equipment in the KTO reduced both the combat strength that a coalition ground offensive would have to face and the capabilities of the postwar Iraqi army.[88]

The close and complementary relationship between operational-level attacks in the KTO and the strategic strikes illustrates the difficulty encountered in trying to divide targets into neat categories. But whatever the label, ensuring a coherent and focused use of available power was the critical factor; and centralized guidance ensured that all air attacks contributed to the theater commander's objectives, whether in the strategic assault on the Iraqi regime or the operational attacks against combat power in the KTO.[89]

The attacks in the KTO began on the first day of the air campaign. After the first week, the KTO absorbed a majority of the coalition's combat sorties until the end of the war. Including the attacks on the Republican Guard from the strategic effort, the sorties flown against targets in the KTO totaled more than 35,000. By the start of the ground campaign, approximately 90 percent of the combat sorties were being flown against targets in the KTO.[90]

The objectives of the theater portion of the air campaign paralleled those of the strategic phase, with emphasis on destroying the combat potential of the Iraqi ground forces defending occupied Kuwait. The air attacks first worked to reduce Iraq's extensive integrated air defense system that included even more low-altitude SAMs and AAA pieces than the strategic IADS. Then, to preclude a preemptive ground attack and limit any counterattack options, the strikes focused on reducing the offensive potential of the Iraqi forces. The emphasis then shifted to a concerted effort against Iraqi defensive capabilities in support of the ground campaign plan, an effort the Army refers to as preparation of the battlefield.[91]

Command and Control

As at the strategic level, Iraq's senior leaders and the command and control system were high priority targets for theater operations. Although tactical command nets are even more difficult targets than strategic systems, coalition air strikes on command posts and C^3 sites—complemented by electronic warfare activities and by artillery and missile fire—severely degraded the ability of the Iraqi ground force commanders to control their forces. This was particularly true for those units in the frontline positions in Kuwait.[92]

Iraqi ground commanders often had very poor information, including the status of their own forces. They also often had great difficulty in issuing orders to their subordinate units. By the start of the ground war, corps and division commanders had limited, undependable communications with their lower echelon units in forward defensive positions. Messengers were often the only reliable means of communications. Some of the Iraqi commanders who were captured during the ground offensive reported that they had not been in contact with their commanding headquarters for more than a week when the coalition ground campaign began. This situation severely constrained Iraq's ability to react to the coalition's fast-paced ground maneuvers.[93]

Direct Attacks on Combat Units

The air attacks in the KTO also struck hard at the Iraqi army's equipment. Rather than trying to kill large numbers of Iraqi troops, coalition pilots sought out the tanks and artillery pieces that made the Iraqi army a potentially dangerous adversary in ground combat. By destroying this component, the coalition's air campaign limited Iraq's ability to react to the pending ground offensive. It also removed much of Iraq's capability to continue threatening its neighbors after the war.[94]

Individual pieces of equipment, especially armored vehicles, are difficult targets for air attack, particularly from medium and high altitudes. However, the coalition's air leaders displayed a remarkable flexibility in developing tactics and using available technologies to kill a large number of Iraqi tanks and artillery pieces. General Schwarzkopf had so much confidence in the air campaign that he based his decision to start the ground campaign on a set level of estimated damage to the equipment assigned to Iraqi units. At the start of the ground campaign, the USCENTCOM staff estimated that Iraq's frontline units had been reduced by air attack and desertion to effectiveness levels below 50 percent and that the more rearward units had been reduced by at least 25 percent.[95]

Sustained air attacks on Iraqi equipment wore down the combat strength of the ground forces, and the Iraqis had few options in response due to the coalition's air superiority and its ability to fly and fight at night. If Iraqi units attempted to maneuver, they were even more visible to coalition pilots and even more vulnerable to attack than when they hunkered down in their defensive positions. The Iraqi army therefore absorbed the continuous pounding while anticipating a coalition ground assault.[96]

Logistics—Interdiction

The Iraqi army was damaged not only by direct attack, but also by an aggressive interdiction effort against the Iraqi logistical system within the KTO. These attacks meshed with the strategic effort to isolate Iraq's theater forces. Key interdiction targets were bridges, railroad marshalling yards, convoys (especially when held up and concentrated at a choke point such as a destroyed bridge), fuel depots, and supply points. The interdiction strikes reduced on-hand stores and, in some areas, virtually halted the movement of supplies to combat units.[97]

Coalition interdiction strikes very quickly reduced Iraqi supply levels below those needed to sustain offensive operations. Within two and a half weeks, the Iraqi logistical base was cut below the level needed to conduct sustained defensive operations. After 25 days, many Iraqi units were not even receiving the supplies needed for basic subsistence. Parts of Iraq's army were beginning to starve before the coalition launched its ground campaign.[98]

Iraq's combat potential was physically reduced by the almost constant air attacks within the KTO and by the reduced logistical support for combat units. Just as importantly, the bombing undermined the psychological will of the Iraqi soldiers to fight, a situation that was exploited by coalition psychological warfare operations.[99]

Psychological Operations

The coalition's air superiority had a heavy psychological impact on the Iraqi military, and the coalition attempted to amplify this effect with psychological operations and with air attacks designed as much for psychological impact as for destructive results. B-52 raids were especially effective in this psychological war. The US also dropped several 15,000-pound bombs (designated the BLU-82) from C-130s in an effort to erode Iraqi morale. The psychological operations campaign also included radio broadcasts, high-powered speakers on the front lines, and pamphlet drops.[100]

The actual psychological impact of the air campaign and the psychological operations is hard to gauge, but the degraded status of most Iraqi ground force units at the start of the ground campaign was a clear indication that the air campaign had been highly successful. Beyond the physical damage, many units were well below authorized strength levels because of desertions and the inability or unwillingness of soldiers on leave to return to their combat positions in the KTO. Some estimates place the number of deserters at over 150,000—almost 30 percent of the estimated number of troops assigned to the KTO. Captured Iraqi officers reported an average desertion rate of approximately 42 percent.[101]

The psychological impact of the air campaign was also seen in the weak resistance of many Iraqi soldiers. Some surrendered at the first possible moment. Others engaged in a brief exchange of fire with coalition ground forces before surrendering. Some, especially in the Republican Guard divisions, put up a more intense fight before being overwhelmed by the speed and firepower

of the coalition's ground offensive. But the air campaign had taken the fight out of many Iraqis and had created the conditions that allowed coalition ground forces, with minimal casualties, to successfully attack an enemy in prepared defenses. The coalition took 7,000 prisoners on the first day and a total of 78,000 by the end of the war. One captured Iraqi division commander, when asked why his men surrendered so easily, replied simply, "It was the airplanes."[102]

After 12 days, the Iraqis launched a series of attacks across the Saudi-Kuwaiti border. Although the exact objectives remain unclear, the attacks were probably designed to draw the coalition into a ground battle in which the Iraqis could use their army to bleed the coalition in a "ground Tet" scenario. Two Iraqi divisions, the 5th Mechanized and the 3d Armored, attempted an offensive with no air support. The attempt was unsuccessful, however; US Marine Corps and Saudi ground forces with air and artillery support contained the offensive within the border area. The Iraqis succeeded only in capturing the abandoned border town of Al-Khafji.[103]

The coalition's response to the Iraqi offensive clearly demonstrated the value of air superiority and close air-ground cooperation. The Iraqis lacked aerial reconnaissance and air support while coalition aerial reconnaissance assets, including TR-1, E-8 JSTARS, and unmanned aerial vehicles (UAV), detected and monitored the massing of several hundred Iraqi tanks and other armored vehicles for the attack.[104]

Coalition ground forces received fire support from Marine AH-1W helicopters, AC-130 gunships, and a variety of fixed-wing aircraft. The combined air-ground defense quickly broke the back of the Iraqi offensive. The coalition's deep-look surveillance capability enabled air power to disrupt the Iraqi attacks before they gathered momentum. On the first night of the attack, a JSTARS crew detected a large convoy moving toward the Saudi border and vectored one special operations AC-130 and two A-10s to the convoy. The result was 58 of 71 Iraqi vehicles destroyed.[105]

On the second night of the battle, the two Iraqi divisions were seriously damaged by air attacks before they could close with coalition ground forces. AV-8Bs, F/A-18s, A-6s, A-10s, F-15Es, F-16s, AC-130s, and B-52s attacked troop concentrations, tanks, armored vehicles, trucks, and artillery pieces. The B-52s also dropped armor-sensing mines in the path of the Iraqi advance. In the course of one night, air power had destroyed the combat power of two divisions.[106]

The taking of Khafji ended as a dismal failure for Iraq. A Saudi-Qatar task force quickly recaptured the town and reestablished coalition control of the border. The coalition's performance demonstrated the vulnerability of surface forces to air attack when they are moving in the open. This was a very serious omen for the Iraqis, who were already suffering serious losses in their dug-in defensive positions.[107]

Air superiority and the ability to coordinate aerial firepower with ground forces were the keys to coalition victory at Khafji. These were also keys to

success when the ground campaign exploited the effects of the air campaign on day 39 of the war.

The Ground Campaign

The air campaign severely damaged the Iraqi military power in the KTO and, although had it had not yet forced Saddam Hussein and his military commanders to leave Kuwait, the air offensive created the conditions for success in the ground campaign. Perhaps in time Saddam would have withdrawn from the pressure of the air attacks, but his personality or his political situation might not have allowed that—and he might not have known how badly his forces had been hurt. A combination of the coalition's successful C^3 attacks and the false reporting that often occurs in a tyrannical system might have blinded him to the real truth. In any event, General Schwarzkopf initiated a ground campaign to administer the coup de grace to the Iraqi army.[108]

The ground offensive plan had been developed in close harmony with the air campaign. The coalition's total air supremacy prevented Iraq from detecting the massive shift of ground forces to the west for a deep envelopment. Even if Iraq had detected the move, the battle at Khafji suggested an ill fate for any Iraqi forces attempting to counter the flanking move. The coalition's air supremacy, the air attacks in the KTO, the Marine and Arab ground forces along the Kuwaiti border, and the threat of a Marine amphibious assault on the Kuwaiti coast combined to fix the Iraqi forces in the KTO until the ground offensive had started.[109]

During the offensive, coalition air power provided support to the ground forces as needed while sustaining pressure on strategic targets and deep targets within the KTO. Coalition air forces continued to disrupt Iraq's logistical system and to attack Iraqi units, especially when they attempted to move. Coalition pilots also provided fire support whenever required by the ground forces.[110]

Because of the successes of the air campaign, the nature of the plan, and the speed of execution in the ground campaign (the 100-hour war), close air support was not a major factor. Poor weather in the early portion of the ground attack made CAS missions very difficult; but whenever needed, CAS was available.[111]

The multinational nature of the ground forces created potential problems for coordinating air support missions for the ground operation. During Operation Desert Shield, the coalition had developed procedures and trained to ensure that support was available to all countries and that the probability of fratricide was low. Unfortunately, some "friendly fire" deaths occurred in spite of all the preparation—an example of the dangers and difficulties of CAS operations. CAS missions were flown whenever needed by ground forces, but most of the air support was flown against deeper targets.[112]

The success of the theater campaign, a truly joint operation, was founded on the successful application of air power. Stressing this fact, General McPeak

stated that within the context of a joint campaign, this was "the first time that a field army has been defeated by air power."[113]

The Impact of Air Power

The rapid success of the ground campaign is a testimony to the synergistic effects of a joint forces campaign plan that exploited the advantages of the coalition, especially air power, and avoided the strengths of the adversary. The air assault established air supremacy quickly, allowing the rest of the air campaign to accomplish its objectives with minimal disruption. These attacks paralyzed the Iraqi leaders' command structure, reduced their ability to threaten their neighbors after the war, and created the conditions for a rapid ground campaign to liberate Kuwait.

The entire experience illustrated the continuing relevance of the core tenets of air power theory, including the potential dominance of air power in modern warfare. As summarized by President George Bush, "Lesson number one from the Gulf War is the value of air power."[114]

Notes

1. For the Department of Defense assessment of air power in the Gulf War, see Dick Cheney, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, D.C: Government Printing Office, April 1992), xiii–xiv, 117–247. For the Air Force view of the war, see Headquarters USAF, *Reaching Globally, Reaching Powerfully: The United States Air Force in the Gulf War* (Washington, D.C.: Department of the Air Force, September, 1991); Headquarters USAF, *The Air Campaign Against Iraq* (Washington, D.C.: Department of the Air Force, March 1991); Headquarters USAF, *Air Force Performance in Desert Storm* (Washington, D.C.: Department of the Air Force, April 1991); Gen Merrill A. McPeak, press briefing on Operation Desert Storm, Washington, D.C., 15 March 1991; and Richard P. Hallion, *Storm over Iraq: Air Power and the Gulf War*. See also, Gen H. Norman Schwarzkopf, press briefing on Operation Desert Storm ("The Mother of All Briefings"), Riyadh, Saudi Arabia, 27 February 1992, transcribed in *Military Review*, September 1991, 96–108; Les Aspin and William Dickinson, *Defense for a New Era: Lessons of the Persian Gulf War* (Washington, D.C.: Government Printing Office, 1992), 7–12.

2. Dick Cheney, *Conduct of the Persian Gulf War: An Interim Report to Congress* (Washington, D.C.: Government Printing Office, July 1991), 15-3; Cheney, *Final Report*, 141, K-12, K-13; *Air Campaign*, 13; Aspin and Dickinson, 9–10; Senate, *Operation Desert Shield/Desert Storm, Hearings before the Committee on Armed Services*, 102d Cong., 1st Sess., 1991, 247–48; Charles A. Horner, "The Air Campaign," *Military Review* 71 (September 1991): 17, 20–26; Michael Dugan, "The Air War," *U.S. News & World Report*, 11 February 1991, 26–27. For a discussion of the role of the JFACC in planning, see chapter 4.

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5. McPeak briefing; Patrick E. Tyler, "U.S. Says Early Air Attack Caught Iraq Off Guard," *New York Times*, 18 January 1991, A10; Dugan, 25–26; Bob Woodward, *The Commanders* (New York: Simon & Schuster, 1991), 370, 374.

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7. Cheney, *Interim Report*, 2-3, 2-6 thru 2-8; James P. Coyne, "Plan of Attack," *Air Force Magazine*, April 1992, 40–46; Horner, "Air Campaign," 21–42. See chapter 4 for details of the air campaign plan.

8. McPeak briefing; Cheney, *Final Report*, xxi, 141, 151–52, 344; *Reaching Globally*, 15; Cheney, *Interim Report*, 24-2. For background on deception concepts, see Donald C. Daniel and Katherine L. Herbig, *Strategic Military Deception* (New York: Pergamon Press, 1982); Michael Dewar, *The Art of Deception in Warfare* (Newton Abbot, Great Britain: David & Charles Publishers, 1989).

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44. Cheney, *Interim Report*, 2-6, 4-2. For details on the logic of the objectives and the campaign philosophy, see chapter 4.

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46. *Air Force Performance*, 1–2; Horner, "Air Campaign," 24–27; *Reaching Globally*, 52–53; *Air Campaign*, 19–20.

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Chapter 6

Air Power Theory Revalidated

The defeat of Iraq and the liberation of Kuwait was built upon the capabilities of air power and the successful application of the core tenets of air power theory. While these tenets do not provide a specific road map for future planning, they do provide a framework for discussions of future force structures and future operational and strategic concepts. Operations Desert Shield and Desert Storm serve not as models for future emulation, but as useful reminders of the fundamental nature of air power—now truly aerospace power—and of the central truths surrounding use of the third dimension in war.

Desert Shield and Desert Storm were conducted in a unique situation. The environment, the combat scenario, and the characteristics of the adversary were all highly favorable to the application of air power. The specific approach used in this war will therefore not be directly transferable to all wars and all combat scenarios. Nonetheless, the experience did highlight the essence of air power and its roles in modern war.

Operation Desert Shield clearly demonstrated the value of air power's speed and global range in responding to international security threats. Strategic airlift and the rapid deployment of air and surface forces helped deter further aggression and, along with naval air power, provided the foundation for a wide range of military options. Strategic and tactical airlift supported the continued deployment of combat forces and helped sustain them with timely resupply throughout both operations.

Air power's range, speed, flexibility, and ability to quickly concentrate accurate firepower were critical to the success of Operation Desert Storm. The potential for intercontinental bomber attacks from the continental United States was effectively illustrated for the first time. Aerospace platforms also provided critical reconnaissance and surveillance support for coalition planners and commanders. Space systems, from communications and navigation support to surveillance and warning operations, expanded the horizons of modern warfare.

These capabilities were woven into a command structure and campaign plan that clearly incorporated the basic elements of air power theory. The intellectual framework for this was provided by people who had studied war and the use of air power in war. The use of air power was also shaped by the strong operational culture of the US Air Force (informal doctrine) and by the service's formal doctrine that traces its lineage to the early air power theorists. Doctrine is the key vehicle for conveying theory in a practical form

to a military force. Desert Shield and Desert Storm showed the effectiveness of applying theory through doctrine.

At the essence of air power theory is the idea that air power is the dominant component in modern warfare, potentially the decisive one.

Decisiveness

The belief of air power theory, and the reality of the Desert Storm experience, is that air power can be the decisive factor, or at least one of the decisive factors, in war. Decisiveness is somewhat difficult to define and the concept tends to provoke angry debates between advocates of the various services. However, the question is not whether the Air Force is the dominant service; rather, it is whether control of the air and the ability to operate freely in the third dimension give a military force the dominant position in war and combat. And the answer is yes—all services are dependent on, and vulnerable to, operations in the aerospace environment.

Air power theory, therefore, contends that one of the first planning considerations should be how to dominate the aerospace arena. Control of the air allows the military force to conduct all other types of operations, whether in the air, on the land, or on the sea. The coalition's ground attack would have been very difficult without air supremacy.

Desert Storm demonstrated that aerospace power can be applied as a strategic weapon. It can be directed at the enemy state's base of power, its leadership, and its ability and will to conduct and sustain military operations. The ultimate aim of strategic attack is to achieve the national objectives by directly attacking and defeating the enemy state. Strategic air operations are normally conducted independently of the surface forces, but, as Desert Storm showed, the strategic effects may complement and significantly enhance the combat potential of other forces.

Air attacks may also be decisive at the theater or operational level where the air campaign plan is more closely linked to surface operations. The synergistic relationship between different types of military forces makes joint warfare a powerful tool. Control of the air allows easier surface operations, ensures direct support to friendly forces, and allows air strikes to degrade the enemy's military capabilities. Surface forces can help theater air forces by forcing the enemy to concentrate and to move, creating targets for air attack. Air-ground teamwork is the key, but the unique characteristics of air power must be recognized and used.

Air power, especially in strategic operations, must be employed with a clear understanding of the specific military and political situation. Victory can be achieved only if the commander and his planners have clear objectives and if they have accurate assessments of the capabilities and constraints of both sides involved in the conflict. For air power to have a decisive strategic effect, air planners must understand the enemy. The air campaign plan must iden-

tify the enemy's centers of gravity, his vulnerabilities, and his ability to threaten friendly centers of gravity.

To be effective and decisive, air attacks must be based on good intelligence. Intelligence includes both hard information and analytical assessments that may require a certain amount of intuitive insight. Timely, high-quality intelligence is required for planning, and for keeping the air operation focused on potentially decisive targets as the war unfolds and circumstances change. Target selection focuses the offensive power of aerospace forces.

Offensive Operations Dominate

The decisiveness of air power comes from its inherent offensive capability. The coalition's air campaign was a classic example of the effective use of air power in an intense, well-focused air assault. The Iraqi Scud campaign illustrated the potential impact of offensive air attacks by a limited aerospace force, a potential that is greatly magnified by the availability of weapons of mass destruction. The speed, range, and concentrated firepower of offensive air strikes can seize the initiative, shock the enemy's leadership and combat forces, and destroy key elements of the enemy's national power and combat capability.

Air power can be used defensively of course, but ideally as a complement to its offensive capability. The coalition displayed a balance between offensive and defensive forces, emphasizing defensive operations early in Desert Shield. Later, the defensive capability was used to defend the rear areas while offensive attacks removed Iraq's air and missile strike capability. The experience of the Iraqi air force suggests the fate awaiting those who rely totally on the defensive in aerial warfare.

Offensive operations, then, are the key to decisiveness, but air attacks must be properly focused to achieve the desired results. Air power theory argues that a centralized control system is a necessity for effective air warfare.

Centralized Control

Operations Desert Shield and Desert Storm highlighted the importance of the centralized control of air assets. The command structure established for planning and control ensured that all available aerospace resources from a range of countries and services were smoothly integrated. This process ensured that the available resources were directed at the right target at the right time in order to get optimal results.

The Joint Forces Air Component Commander, Lt Gen Charles A. Horner, and his staff were key to the success of the Desert Storm air campaign. The centralized command structure ensured that air operations supported the stated objectives and the theater commander's concept of operations. The

flexibility and speed of air power, and an extensive command and control system, allowed coalition forces to react to changes in the combat situation and keep air attacks directed at the most critical targets.

Control of the Air

The Desert Storm air campaign is a strong example of why air power theory places such heavy emphasis on gaining control of the aerospace environment. By seizing air supremacy in the initial phase of the campaign, the coalition virtually ensured victory. The coalition's early attacks demonstrated the dominance of the offensive as well as the value of surprise and preemption in aerial warfare. With air supremacy, coalition forces were able to conduct all of their operations without interference from Iraqi air attack.

In the face of coalition control of the air and blinded by an absence of aerial reconnaissance, the entire Iraqi military was subjected to almost constant air attack. In contrast, the coalition constantly monitored Iraqi activities from the aerospace high ground; and its air forces could do what they wanted when they wanted with little concern for the Iraqi reaction. The coalition seized the initiative in the opening minutes of the air campaign by taking control of the air, and they maintained it throughout the war.

Quality Wins

The coalition's success in seizing control of the air and applying decisive offensive air power reflects another theme from air power theory—Quality Wins! Aerospace combat is at its essence technological warfare. Therefore, the most advanced technologies have an edge. Coalition advantages in stealth, precision attack, satellite-based navigation, electronic warfare, and night attack capabilities are but a few examples of high-technology equipment that contributed to the coalition victory. A common assessment after the war was that air power technology had finally come of age and that its capabilities had finally merged with the promise of theory.

Quality, however, is not related just to equipment. People use the equipment and plan the employment of modern weapons, and the coalition clearly had an advantage in human resources. Good coalition leadership—well-educated, nondogmatic, willing to allow initiative at lower echelons—helped ensure that coalition air forces were effectively used. At the tactical level, coalition aircrews were motivated, highly skilled, and well trained.

The US military services in particular reflected the high-quality approach to combat. They benefited from a decade of funding that allowed them to field first-rate equipment and from skills that had been honed by extensive, aggressive training from the individual level to the small unit level to the large

unit level. Good equipment and good training are expensive, but the investment paid off handsomely in Operation Desert Storm.

Air Force-in-Being

A corollary to the importance of quality in air power theory is that quality, and therefore victory, flows from having an adequate air force-in-being at the start of the war. Only a force-in-being can be honed to perfection in training and have the skills needed in modern aerial combat. The rationale for this force also includes the importance of air operations in the initial period of the war. Decisive air operations at the start of a war can establish the conditions of victory. Therefore, no country concerned with its national security should be without adequate air power. Also, the necessity of having an adequate air force at all times reflects the reality that a quality air force—equipment, logistical support, and training—cannot be easily built up after the start of the war.

Beyond simple combat power, the force-in-being must have a strong support base, especially if it is going to project power globally. The air force-in-being requires a strong logistical base, maintenance support, security, and intelligence support. It must have adequate reconnaissance and surveillance capabilities. If the air force is to conduct sustained operations overseas, it will also require preplanned basing agreements, combined training exercises, prepositioned equipment, and transportation support—airlift and sealift. Air power is not a simple tool!

Operations Desert Shield and Desert Storm illustrated that active duty forces-in-being can be backed up by national aerospace resources. The air reserve components illustrated their value in important support capabilities and in adding mass to the combat forces—a mass that is too expensive to maintain in the active force. Aerospace operations also drew on civil systems—communications satellites and airliners—to complement the military assets. Although aerospace capabilities are generally too complicated to allow a rapid surge in production for major weapons systems, the US military was able to use some capabilities that were in developmental stages and to quickly develop and field some limited systems.

Victory Through Air Power

The US military had a significant air power capability when Iraq invaded Kuwait. This force was well trained, well equipped, and well led—a quality force. It deployed rapidly to stabilize the situation. It was honed throughout Desert Shield, and it seized the initiative from Iraq at the very start of the war. The aggressive offensive air action provided the foundation for victory through its impact on Iraq's leaders and combat forces, and on the national

capability and will to sustain the war. In Operations Desert Shield and Desert Storm, the air force-in-being of the US military was decisive. Its operations provided a clear example of the continuing relevance of air power theory to the modern military.

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