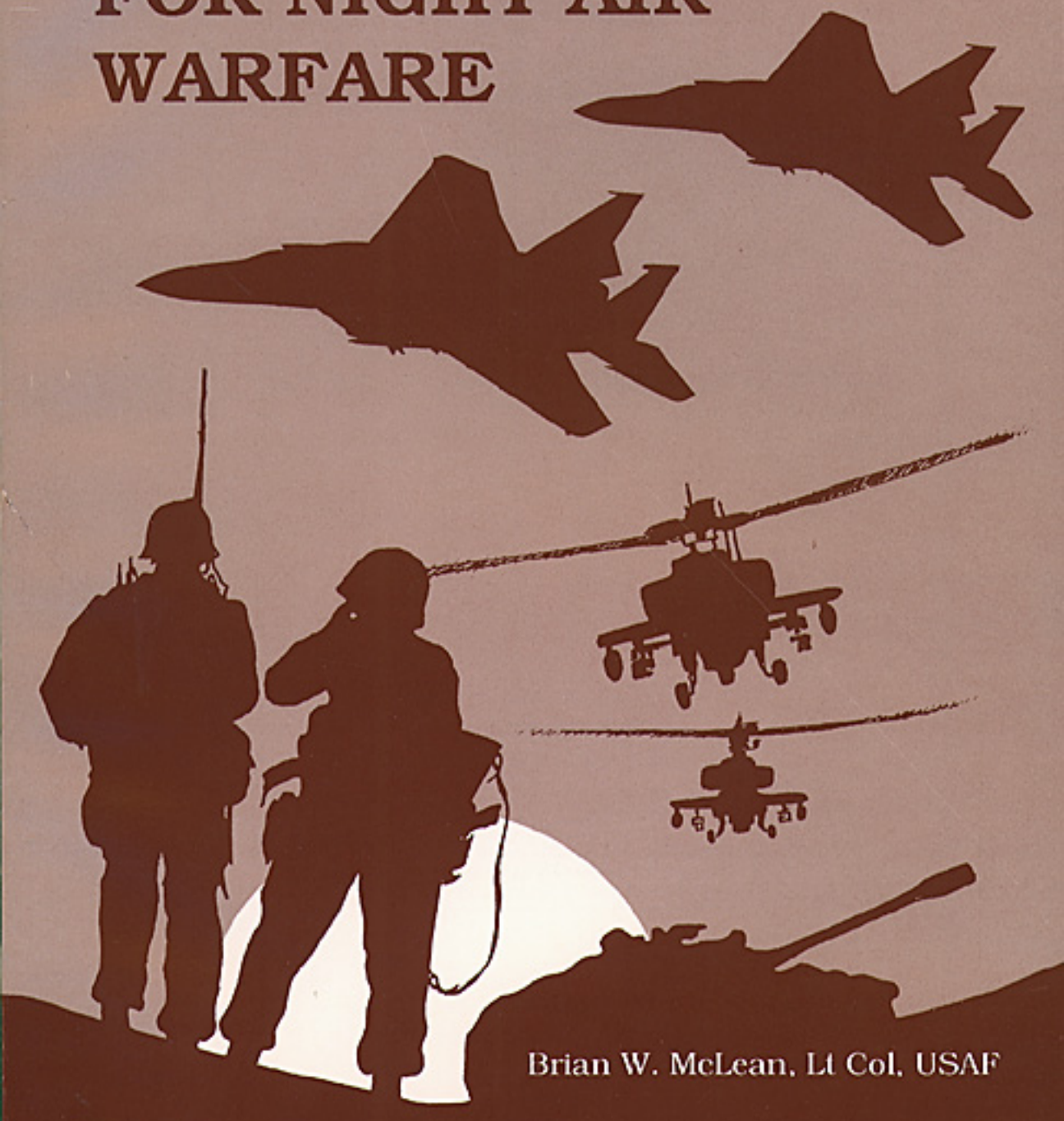
JOINT TRAINING FOR NIGHT AIR WARFARE



Brian W. McLean, Lt Col, USAF

Winner of the Air Force Historical Foundation's 1991 Colonel James Cannell Memorial Award

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Joint Training for Night Air Warfare

by

Brian W. McLean, Lt Col, USAF
Research Fellow
Airpower Research Institute

Winner of the Air Force Historical Foundation's 1991 Colonel James Cannell Memorial Award

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Foreword

The reality of today's world is that although the threat of World War III may be greatly reduced, the possibility of wars involving American troops remains high. These wars probably will be conducted by large and complex joint staffs and likely will be characterized by intense activity carried out regardless of weather, time of day, or seasons of the year. Our most recent experiences in Panama, Grenada, Libya, and the Persian Gulf have proven that modern war requires joint air, land, and naval forces fighting both day and night. Are we preparing to do this? Are we training for air operations using all forces at our disposal in a war that may begin in the middle of the night?

The author's contention is that training for night air operations, particularly with our sister services, is in its infancy. Using his personal experience he sets out to recommend better uses of the training facilities of all the services to improve the situation. After examining the history of joint operations and night air operations, presenting a hypothetical joint night scenario to show the tremendous challenges of such operations, and describing the current status of joint night training programs, the author recommends a phased building-block approach that should increase the Air Force's capability to perform both single-service and joint operations any time of the day or night. This will ensure that we train as we plan to fight in future air operations.

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About the Author

Lt Col Brian W. McLean

Lt Col Brian W. ("Bingo") McLean prepared this book as the Pacific Air Forces (PACAF) command-sponsored research fellow for 1990–91 at the Airpower Research Institute (ARI) for the Air University Center for Aerospace Doctrine, Research, and Education (AUCADRE), Maxwell Air Force Base (AFB), Alabama. A 1974 graduate of the US Air Force Academy (USAFA), Colonel McLean holds an undergraduate degree in International Relations (Far Eastern Studies) from the USAFA and a master's degree in history from Old Dominion University. Professional military education includes Squadron Officer School (in residence), Air Command and Staff College (by correspondence), and Air War College (in residence).

A master navigator, Colonel McLean has accumulated nearly 3,000 flight hours since completing navigator training as a distinguished graduate in March 1975. From 1975 to 1977 he was a C-141 navigator at Travis AFB, California, when he was selected to cross train as a weapons system officer (WSO) in F-4s. Transition training at MacDill AFB, Florida, was followed by assignments as a WSO and instructor WSO to Royal Air Force (RAF) Bentwaters, United Kingdom (UK); Osan Air Base (AB), Korea; and Moody AFB, Georgia. In 1983, after completing his assignment at Moody AFB, Colonel McLean volunteered for Air Force–Navy officer exchange duty as an F-14 instructor radar intercept officer (IRIO) in F-14s at Naval Air Station Miramar, San Diego, California. During his exchange tour with the

Navy, Colonel McLean earned the somewhat dubious distinction of being the IRIO in the first all–Air Force crew to land an F-14 aboard an aircraft carrier. From 1986 to 1989, Colonel McLean served on the staff at Headquarters Tactical Air Command (TAC) under the Deputy Chief of Staff for Requirements followed by a tour at Headquarters PACAF under the Deputy Chief of Staff for Operations. His assignment at Hickam AFB was curtailed when PACAF selected him as the PACAF command-sponsored research fellow and, simultaneously, to be a member of the Air War College class of 1991.

Colonel McLean, his wife Peg, and children Alexander and Mary Eileen are currently stationed at Headquarters United States European Command, Patch Barracks, Stuttgart, Germany, in the Theater Plans Division of J-5, Plans and Programs.

Preface

The genesis of this book can be traced to two specific assignments, my Air Force–Navy officer exchange duty in F-14s and my tour on the staff in the Special Management Organization for low-altitude navigation and targeting infrared for night (LANTIRN).

From my experiences with the Navy, I gained an appreciation for how well the services can work together if we can overcome the challenges to joint operations. My experiences since then with Marine and Army personnel convinced me that the same discipline, pride, and expertise run through any warrior, regardless of what color uniform he or she wears or what service insignia is painted on the side of the airplane. This ingrained devotion to duty, properly directed toward mission accomplishment, can override any sense of interservice rivalry and greatly increase the sum total of military power through joint operations. This inherent capability is limited, though, because of a lack of an in-depth awareness of each other's capabilities and limitations.

Following this exposure to the possibilities of joint operations, my tour in the LANTIRN office at Headquarters TAC convinced me that future air warfare must include night combat. The tactical capability provided by the emerging night technology was too great to be neglected. Each of the armed services had or was developing the technology for night air warfare, but there was no formal program to develop or train for joint night tactics or operations. When I was offered the opportunity in February 1990 to compete for the PACAF command-sponsored research fellowship at AUCADRE, I saw this as an opportunity to point out what I considered a significant oversight and propose a solution to the issue.

Although this book was started well before the events of Operations Desert Shield/Desert Storm, I was personally gratified to see my initial assumptions validated. Joint operations, including joint night operations, are a critically important part of modern warfare. The success of Operation Desert Storm was the result of joint development and training efforts during the months of Desert Shield. We must

continue those efforts now to ensure a future capability, particularly if we do not have five months of preparation time in theater before the initiation of combat. This report has a proposed training method for ensuring that capability.

I ask the reader to keep two key factors in mind regarding the conclusions and recommendations in this book. First, there is nothing wrong with the way that we have trained for joint night operations in the past or in the way we are training for them today. The training programs in place are the best that could be safely and prudently done, given the technical capabilities in existence. This book attempts to suggest a way that future training can be guided to incorporate new technology for a greater employment capability. Second, I am not the Air Force expert for the definitive joint night training program. During this last year I have been afforded the luxury of time to consider long-term possibilities; I must leave it to those responsible for dealing with short-term realities to determine if my suggestions are feasible. I would welcome the opportunity to assist them in any way possible to implement this plan.

I want to express my deepest personal gratitude to Lt Col Jim Brungess, my former boss at Headquarters PACAF. Jim made me aware of the research fellow program at AUCADRE and kicked my backside to get my application done in time. You cannot ask more from a leader than that he look after the needs and advancement of his people. Jim personifies the very essence of an Air Force leader. I also want to thank my academic advisor, Dr Lawrence Grinter, and my editor, Hugh Richardson. They took my crude concepts and molded them into a coherent whole. I knew what I wanted to say; they made sure that I really said it.

This has been a very rewarding but also a very difficult year. In addition to writing this book, I attended Air War College. The combined study, research, and writing work loads of the two programs made for a typical workday of about 18 hours.

I cannot say enough good things about my wife, Peg, the one person that made the whole year possible. She enabled me to keep my sanity and perspective, picked up the family duties when I had to be off somewhere studying or writing, and somehow understood when the planned trip to Disney World had to be delayed by three months. There

is an old saying that if the Air Force wanted you to have a wife, they would have issued you one. In Peg's case, I think they did. Her father is a retired B-52 pilot, the sister who introduced us is married to an F-4 weapons system officer, and I first met Peg in the Officers Club at Moody AFB, Georgia. Peg might be government spec, but I guarantee she is one of a kind. Although during this past year I have forgotten to thank her often enough for all that she did, I hope she knows that I love her dearly and could not get by without her.

As I seek to finish this, I am sitting in my office at Maxwell, looking out at the 13th fairway of the golf course, and trying to convey in writing what this last year has meant to me. The only way to express that is to ask myself three questions: Has the year been worth the effort? Is the effort something I can take pride in having done? Knowing what I know now, would I do it again? The answer to all three is a resounding and unqualified yes.

BRIAN W. McLEAN, Lt Col, USAF
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Introduction

As the United States enters the decade of the 1990s, we are faced with a world substantially different from that which our fathers faced in the middle decades of the twentieth century. The near paranoia and fear of a global war between the North Atlantic Treaty Organization (NATO) and the Warsaw Pact have been reduced to the point of nonexistence. The 40-year cold war has been "won."

Victory in the cold war has not, however, totally eliminated the need for American military involvement outside the NATO/Warsaw Pact area. The reality of conflict requiring the use of military forces has changed only in scale and locale, not in kind. As this book is being written (January 1991), American and allied forces are deeply committed in Operation Desert Storm, a war to liberate Kuwait from Iraq's unprovoked aggression and to bring peace and stability to the region. Operation Desert Storm is the most obvious and visible conflict involving US forces; by no means is it the only part of the world in which armed conflict may occur. The border between North and South Korea is still some of the most heavily fortified terrain in history. Fidel Castro's demonstrated predilection for generating tension throughout Latin America is still a reality, and the continuing war in Cambodia has the potential of overflowing into the territory of America's ally, Thailand.

Although the possibility of World War III has been greatly reduced, there is a high probability of future wars involving American troops. The war today is in the Persian Gulf. Next week it could be in Korea or Central America. If war comes, what form will it take? Will it be a series of small, isolated land, sea, and air battles? Will the actual battles be limited to only daytime and good weather, reserving the night and the rainy season for rest and recovery while planning for the next day? Both of these questions are obviously rhetorical. As Col Dennis M. Drew and Dr Donald M. Snow demonstrated in *The Eagle's Talons*, war in the second half of this century has been conducted by large and complex joint staffs and characterized by a high tempo of activity carried out

regardless of weather, time of day, or season of the year.[1] The most recent US military experiences in Grenada, Libya, and Panama gave no indication that this will change. Operation Desert Storm, begun with nearly continuous aerial bombardment by all US and allied aircraft, validates with emphasis that modern war is joint and around-the-clock.

Our allies understand and accept this trend, particularly the tendency for air warfare to involve night, all-weather operations. In the Fall 1987 issue of *Airpower Journal*, Air Vice-Marshal R. A. Mason of the Royal Air Force (RAF) predicted that the probable developments in air power in the 1990s would include around-the-clock air operations through the use of night, all-weather weapon systems.[2] As is being proven in Operation Desert Storm, modern war requires joint air, land, and naval forces to fight both day and night.

If we accept, therefore, that we must fight both in the day and at night and that we must use more than just the forces of one service to do so, the next logical question becomes, Are we prepared to fight this kind of war? Are we, the American military, trained and ready for effective military air operations using all forces at our disposal in a war that may begin in the middle of the night? It is the purpose of this book to examine a narrow portion of exactly that question.

This book addresses the issue of joint training for night air warfare. Although intended primarily to apply to the Pacific Command (PACOM), the issues and questions addressed throughout the book are applicable to any area of potential conflict. This book is specifically limited to joint operations with American forces and does not attempt or intend to include combined operations with international forces. Further, the thrust of the book is limited to night operations. Some of the ideas addressed are applicable to single-service operations at night and joint operations during the day. However, day air warfare, and specifically single-service combat, are subjects that are already studied in depth and the basis of most of our training. It is this author's contention that training for night air operations, particularly with our sister services, is at best in its infancy.

Each of the four armed services has spent literally billions of dollars to acquire the technical means for night warfare. At the same time, the various services have a number of high-technology training centers—Red Flag, Cope Thunder, and the National Training Center, for

example—capable of providing training in all aspects of air war, including regular joint-service participation. However, there is not yet an existing program for joint training in night air warfare at any of these training areas. That which you do not train for in peacetime you cannot reasonably expect to do in war. This book recommends some better uses of available training facilities to improve that situation.

Chapter 1 addresses the history and background of both joint air operations and night warfare to explain how we reached the point where we are today. Chapter 2 addresses the current status of our night air warfare equipment and our system for planning and conducting joint warfare. The author uses a hypothetical air operation against North Korean forces to illustrate some of this capability. Chapter 3 examines the various large-scale training programs and exercises used to practice for night warfare, particularly to determine where weaknesses or limitations might exist. Chapter 4 discusses possible ways of making better use of available equipment and resources for more realistic training in joint night warfare.

It is a recognized weakness of this book that the experiences of Operation Desert Storm are not adequately considered. This is unavoidable, given that Operation Desert Storm has just begun and neither unclassified after-action reports nor lessons learned are yet available. It is hoped that future authors may be able to build upon this book to add the lessons learned in the war against Iraq.

Notes

1. Col Dennis M. Drew and Dr Donald M. Snow, *The Eagle's Talons: The American Experience at War* (Maxwell AFB, Ala.: Air University Press, December 1988), 30.

2. Air Vice-Marshal R. A. Mason, RAF, "The Decade of Opportunity: Air Power in the 1990s," *Airpower Journal*, Fall 1987, 6.

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Chapter 1

History and Background

We have stressed the need for joint night air warfare training. Let us now examine briefly the history of joint operations and night air warfare.

Joint Operations

The American military's modern experience with joint operations started during World War II. The integration of the naval, ground, and air forces in the Pacific theater was a superb example of joint operations using all available resources to accomplish a common objective. Air assets bombarded Japanese positions in advance of amphibious assault by both Marine and Army forces. Once ashore, the land forces were supplied by naval forces and protected from counterattack by both naval and air assets. With the land position secured, forward airfields were prepared to allow land-based heavy bombers to reduce resistance on the next island in the chain, always moving closer to bring the Japanese home islands within range of aerial bombardment. Simultaneously, naval and air forces interdicted all supply lines into Japan, softening the home islands for the final land invasion of Japan. Although the atomic bombs dropped on Hiroshima and Nagasaki eliminated the need for the final invasion, it would have been the ultimate example of joint operations.

From this experience in World War II came a recognition that any future war would have to use joint operations if we were to win. Such disparate individuals as Gen Douglas MacArthur and Adm Chester Nimitz, rival commanders throughout the Pacific campaign, found themselves in complete agreement that joint action between all the

services was responsible for the victory over Japan. Generals George Marshall and Omar Bradley not only agreed that joint action had won World War II but predicted that a joint effort would be required for victory in any future war.[1] The strongest support for this concept was advanced by Maj Gen Follet Bradley, writing to the editor of the *New York Times* in response to a question on the need for a new and separate air power doctrine: "We do not need a Mahan of air power so much as an oracle of combined operations—triphibious. . . . [With] air power in combination with land and sea power on a battle, a campaign and a war."[2]

Clearly, the concept and need for joint warfare was well established by the end of World War II. However, this experience was apparently forgotten between the end of World War II in August 1945 and the North Korean invasion of South Korea in June 1950. In his article in the Spring 1990 issue of *Airpower Journal*, Maj Roger F. Kropf cites "inadequate joint training in air-ground coordination" as a major detriment to the effectiveness of the Far East Air Forces (FEAF) in supporting the Eighth Army in the initial stages of the Korean War.[3] Before the outbreak of the Korean War, FEAF and the Eighth Army did not have any continuing doctrine or training program to develop a coordinated air/ground team.[4] Their performance reflected this lack. By contrast, the United States Navy (USN) and the United States Marine Corps (USMC) did have an ongoing program for air assets to train with the ground units that they were supporting.[5] The best evidence of the success of the USN/USMC training effectiveness was provided by enemy prisoners of war who stated that the allied weapon the North Koreans feared most was "the blue airplanes."[6] (During the Korean War period, US Air Force aircraft were usually silver while USN and USMC aircraft were painted a dark blue.) The Air Force/Army team had to relearn at the cost of American lives what the USN/USMC team remembered about joint operations.

This cycle of learning/forgetting/relearning would be repeated in the time between the Korean War and the Vietnam War. Between the wars we had once again forgotten how to work together due to lack of peacetime practice in joint operations. But unlike our joint experiences

in the Korean War, air operations during the Vietnam War revealed more resistance to cooperation.

At the operational level, the command and control systems established for the air war in Vietnam discouraged rather than encouraged possible joint operations. Under Air Force doctrine, all air assets, regardless of service, should come under a single air component commander. This principle, called unity of command, allows the air commander to mass air assets for a decisive and overwhelming attack against an enemy's weak spots.[7]

The mechanism for achieving this unity of command is the air tasking order (ATO), a single (albeit massive) document listing the total daily air effort. Information in the ATO includes tasked unit, assigned target, and required time over target (TOT) for each sortie to be flown.

To make the system work under Air Force doctrine requires that all air assets come under a single air commander (not necessarily Air Force). Since none of the services in the Vietnam War was willing to relinquish command and control of its air assets to the others, there was not a single air component commander for the entire war effort. Instead, Vietnam was divided in route packages with the Navy controlling some segments and the Air Force others.[8] Air Force aircraft were not tasked against targets in Navy route packages, and Navy aircraft stayed out of Air Force areas. Marine air, because of the physical location of their bases in one of the Air Force designated route package areas, came under Air Force command and control but only for those sorties that were excess to Marine ground-support needs. The Marines retained control over those air sorties that the Marine Corps determined were required to support the Marine ground troops.[9] In effect, air power in Vietnam was split into three separate wars.

This command structure prevented or at least complicated the proper application of mass combat power in joint air operations. Even the massive attacks against Hanoi and Haiphong in Linebacker II were not truly joint in that no single air component commander directed the whole operation. As "the most vital area in North Vietnam," Hanoi was declared an "integrated strike zone" for both Navy and Air Force attacks.[10] Integrated did not, however, mean joint. Each service still

controlled its own assets but now could attack targets in other than its assigned area of responsibility.[11] Although this was a good attempt to bring sufficient combat power to bear on a target, such a practice violated the principle of economy of force. Without a single commander for a joint effort, there was no easy method of ensuring that the Navy or Air Force did not attempt to attack a target that the other had already destroyed.

Difficulty in joint operations was also revealed at the tactical level in the Vietnam War. Lack of common radios complicated the ability of Air Force aircraft to support the Army ground troops. The Army used very high frequency (VHF) or frequency modulation (FM) radios, while Air Force aircraft were equipped with ultrahigh frequency (UHF) radios. These systems were not and are not compatible; communication with each other was impossible.[12] As a result, the Air Force pilot could not talk with the Army ground commander he was supporting without going through a forward air controller (FAC) who was equipped with UHF, VHF, and FM radios. The FAC would then relay the target description, location of friendlies, and enemy air defenses. If there was no FAC in the area, the fighters had no easy way to talk with the ground commander and positively identify the target.

Although the system worked, it added extra layers of control, the possibility of confusion in the ground-to-FAC-to-fighter link, and time delays in getting bombs on target. Suggestions that the fighters be equipped with radios that allowed direct ground-to-fighter communication were rejected, in part because the fighter pilot might be "distracted by irrelevant information" from the ground. Whether or not this was a valid criticism was never operationally tested.[13] Joint Air Force–Army training before the war may have identified a need for direct communication between ground and air and developed appropriate procedures to avoid the worrisome irrelevant information.

The Air Force found that even with the dedicated FACs, the unfamiliar terminology used by the ground troops hampered effective air support operations.[14] As a minor example, even today the Air Force pilot normally judges distance in terms of nautical miles and feet. Aircraft instruments, flight maps, and weapons ballistics are calibrated

in this standard. In contrast, the Army ground troop uses kilometers and meters with instruments and maps calibrated accordingly. The difference between the two systems is extreme; one nautical mile is nearly two kilometers while one foot is less than one-third of a meter. As the reader can readily appreciate, shifting your bomb aimpoint 100 *feet* farther away from friendly troops is not enough when the ground commander wanted you to move it 100 *meters*. It is possible to make a relatively simple mental translation between the two systems if you are aware of the differences and are trained to do so. The Air Force wartime preparation of a pamphlet on how to speak Army is something that should have been identified in peacetime training.

In joint operations during World War II, the Korean War, and the Vietnam War, what we failed to train for in peacetime we had to learn how to do in wartime. As chapter 4 discusses in more detail, we are in danger of making the same mistake again.

Night Operations

If the history of joint operations can be fairly characterized as continually relearning the same lessons, night operations can be described as lessons learned but not implemented due to lack of technology. From World War II until Operation El Dorado Canyon against Libya in 1986, night tactical air warriors were frustrated by equipment limitations. They knew what they wanted to do but lacked the technical capability to do it.

America's first experiences with night air warfare came during World War II, but it came primarily in the form of negative lessons. In the early stages of the war against Nazi Germany, RAF Bomber Command was forced into night area bombing as a method of surviving the German air defenses while continuing to press the air war over Europe. However, night bombing at that time lacked the precision-targeting capability of the American-conducted daylight bombing campaign. According to postwar testimony by Albert Speer, Adolf Hitler's minister of production, the daylight bombing was a far more effective weapon.

The night area bombing of the cities did not achieve sufficiently accurate bombs on target to effectively destroy or disrupt the German strategic war-fighting capability.[15]

These early experiences could have made airmen believe that night air warfare was too tough to do. It is fortunate that air power advocates of World War II recognized that the problem lay in the technology available, not in the basic concept. Even with the limited accuracy available at that time, the combination of US Army Air Forces (USAAF) daylight bombing and RAF night bombing did have the benefit of not giving the German defenders any rest and recovery time in which they could feel completely immune from attack.[16] The night attacks may have been more harassing than they were militarily effective, but they still provided a continuing threat which the German defenses could not totally ignore.

While the strategic air war gained some benefit from around-the-clock operations, it was at the tactical level that the real advantages to be realized from a night air-war capability were demonstrated. For instance, one of the key lessons learned during the interdiction campaign in Europe was the importance of continuous attack on the enemy's lines of communication (LOC).[17] Our inability to find and hit interdiction targets in the dark in effect gave the Nazis a night sanctuary in which they could operate almost at will. Although some limited success was achieved by B-25s dropping aerial flares to locate and illuminate targets for attack by RAF Mosquito bombers, the lack of a night precision capability was a source of constant frustration to both air and ground commanders.[18]

Interdiction was not the only tactical air mission hurt by a lack of night capability. The Luftwaffe, taking a lesson from the RAF's night bombing campaign earlier in the war, demonstrated the importance of having an effective night defensive counterair (DCA) capability during the Battle of the Bulge. By using teams of pathfinding flare ships and attack aircraft at night, the Germans were able to maintain around-the-clock pressure on the fixed American positions in Bastogne. The Luftwaffe's task was considerably easier because of the total lack of effective Allied resistance.[19] The presence of a properly equipped

and trained night fighter could have considerably reduced the effectiveness of the German attack by destroying either the pathfinders or the attack aircraft. In any event, a night DCA capability would have made the Luftwaffe planning problem considerably greater.

While we forgot the lessons learned in joint air operations between World War II and Korea, the same statement cannot be made about the lessons of night air warfare. At the start of the Korean War, we remembered and applied the lessons we had learned about night interdiction and night close air support (CAS) in the skies over Europe. The major interdiction operations were carried out around-the-clock to deny the enemy a period of rest and repair. One particularly effective tactic was the practice of scheduling a late-night reattack against a known LOC that had already been cut during the day. Since the Communist forces used the cover of night to repair and reopen the damaged LOCs, this tactic had a dual benefit. First, the reattack kept the LOC closed, preventing the enemy from using it to move supplies. Second, with proper timing, the reattack could occur just as the repair crew was completing their work, making a wasted effort of their supplies and manpower.[20]

Unfortunately, although we had a good idea of what we wanted to do with night air war, technology had not substantially improved our capability to do it in the interval between the wars. The FEAF B-29s, operating in a tactical support role, achieved reasonable accuracy against fixed targets such as bridges, supply depots, and large troop concentrations by the use of both onboard radar and ground-positioned radar beacons. Although this interdiction effort contributed greatly to the Allied effort by preventing the enemy from massing sufficient supplies to support a continued assault, it could not completely halt the very small amount of supplies necessary for the Chinese and North Koreans to fight a defensive holding war during the prolonged peace negotiations.[21] To achieve that goal, the Air Force would have needed the capability to locate and destroy supplies either at the source or in convoy. Because the source was the politically sacrosanct Manchuria, the interdiction campaign had to be directed against LOCs and the convoys en route. Technical capability for this mission was still limited

to the World War II solution of using flare ships to first acquire the target and then illuminate it for the fighters or light bombers that followed.[22] While this tactic was somewhat effective in the undefended or lightly defended night skies over South Korea, it was completely ineffective and too dangerous in the more heavily defended areas over North Korea near Pyongyang. Aerial flares, necessary for the attacking aircraft to see the target, also served to illuminate the attacker for the antiaircraft artillery (AAA). In addition to simple illumination, the flares helped the AAA gunners find the proper elevation in aiming their fire at the attackers. Since the attacking aircraft had to remain below the flares in order to see the target, the height of the flares showed the maximum height of the attackers.[23]

Although the experiences in night air warfare with the use of flare ships and fighter teams were only moderately effective, they did provide some of the earliest examples of true joint night operations. Beginning in March 1951, a US Marine night-fighter squadron, VMF(N)-513, equipped with F4U Corsairs and F7F Tigercats, began conducting extensive night interdiction missions out of Pusan Airfield. The Marine night fighters worked with Air Force C-47 flare ships as hunter-killer teams. The flare ships would provide illumination to locate convoys or marshaling areas along an assigned road. Once these targets were located, the flare ships illuminated them for the attacking Marine fighters. Close teamwork was required between the two services to ensure that the target was properly illuminated throughout the attack. From 1 March through 31 May 1951, this joint-team mission claimed to have attacked 11,980 enemy vehicles and destroyed 1,420.[24]

Night joint air warfare was not limited to interdiction missions, however. Early in 1951, Communist air defenses over North Korea forced the Air Force B-29s to operate almost exclusively at night. By July 1952 North Korean use of ground-controlled radar was able to direct enemy night fighters to within five miles of the attacking B-29s. From that distance, enemy ground searchlights could then illuminate the bomber for the nonradar-equipped MiG to complete the attack visually.[25] To counter this threat, the B-29s required some form of

night fighters for escort or for preattack sweeps to survive in the now dangerous night skies over North Korea. Although the Fifth Air Force had night-capable F-94B Starfires at Suwon, the radar in these aircraft was so new and so valuable that the F-94s were restricted to only local air defense operations. Once again, joint operations provided the solution. VMF(N)-513 provided night-fighter support for the B-29s using first the older F7F Tigercats, then reequipping with the new F3D-2 Skynight jets in early November 1952. Following the removal of the operational restrictions on Air Force F-94s in November 1952, Marine F3D-2s continued flying joint escort missions for the B-29s while the F-94s took over the barrier patrol and sweep operations.[26]

These joint Air Force–Marine Corps night experiences should demonstrate two points. First, joint operations can provide increased capability by covering shortfalls in single-service equipment. For interdiction missions, the Air Force provided the flare ship capability that the Marines lacked, while the Marine night fighters augmented the limited numbers of Air Force night attack aircraft. For air escort, the Marines initially covered a lack of available Air Force assets, then provided increased numbers of night fighters to escort the B-29s. Second, but more important, even when properly planned and coordinated, night air warfare is tough. The joint Air Force–Marine Corps night interdiction missions, even with proper mission planning, was barely able to achieve a 12 percent kill ratio of trucks destroyed versus munitions expended.

The North Koreans and Communist Chinese were well aware of the tactical benefits to be gained by taking advantage of the FEAF's lack of night capability. As related by Robert Futrell in *The United States Air Force in Korea 1950–1953*,

> A Soviet-prepared manual published by the Chinese Reds in Manchuria in 1947 well illustrated the importance of night attack as a Communist military technique. "Night combat," stated this manual, "is a normal occurrence under conditions of modern warfare. Night combat can be conducted by a small unit, large unit, or by a combined force of the various arms. . . . Despite the difficulty of control during night attacks, it offers many opportunities for success in an attack."[27]

The greatest example of the enemy's understanding of the importance of night capability was demonstrated by the Chinese surprise attack against the United Nations (UN) Forces near the Yalu River in November 1950. By moving only at night and remaining well camouflaged during the day, the Chinese were able to sneak 300,000 combat troops across the Yalu and into the UN rear area in October 1950. They remained essentially undetected until their opening assault in November.[28] Even a rudimentary night reconnaissance and attack capability could have substantially depleted this force or, at a minimum, provided tactical warning of Chinese presence before the attack began.

If the interval between World War II and the Korean War brought only slight improvement in night air warfare capability, the period between Korea and Vietnam brought essentially no improvement. The North Vietnamese recognized the overwhelming equipment advantage that the US Air Force possessed, especially in our interdiction and attack capability. Taking a lesson from the experiences of their fellow Communists in Korea, the North Vietnamese countered American air interdiction by shifting their main resupply efforts to the sanctuary of night operations. The North Vietnamese Army (NVA) and Vietcong went beyond supply at night and took advantage of the night sanctuary to enhance their offensive capability. By staging major ground assaults at night, the NVA was able to largely avoid the American CAS and battle area interdiction that they would have encountered in daylight operations.[29]

The initial Air Force counter to enemy night operations followed the classic patterns established in World War II and Korea—flare ships marking and illuminating the target for attack aircraft to bomb. In some cases, even the equipment was the same, with the use of Korean War–vintage A-26s in the early days of the Vietnam War. Although the equipment used would soon change to more modern F-4s and B-57s,[30] the technology required to change from the World War II tactic of externally illuminated night bombing had not yet arrived. And, just as was demonstrated in Korea, flare ship and bomber teams could not survive in the heavy AAA environment of North Vietnam.[31]

Technology had, however, brought some increased night capability in the form of more onboard sensor systems. Improvements in aircraft ground-mapping radar provided some increased night accuracy for F-4s and F-105s against large, radar-significant targets, such as port facilities or buildings, but lacked sufficient detail to discriminate truck convoys or infantry attacks.[32] Low-light-level television and infrared sensors made the AC-130 an extremely effective night interdiction weapon, but, like the flare ships, the AC-130 lacked the necessary speed and maneuverability to survive in a surface-to-air missile (SAM) or AAA environment.[33]

The limitations imposed on air power by a lack of night capability frustrated the American commanders in Vietnam just as much as it did their predecessors in World War II. In April 1967 Adm U. S. Grant Sharp, commander in chief of Pacific Command (PACOM), formally identified the development of increased capability to accurately hit targets at night and in bad weather as a high priority requirement for prosecution of the Vietnam War.[34] This need was emphasized by Air Force Chief of Staff Gen John P. McConnell that same month. In testimony before Congress, General McConnell stated that the Air Force was deficient in tactical air power, particularly in its ability to hit pinpoint targets at night and in bad weather.[35] However, identifying a need is not sufficient to ensure a capability. By 1971, despite the best efforts of Admiral Sharp and General McConnell, the North Vietnamese continued to move 500 to 1,000 trucks *per night*, down the Ho Chi Minh Trail with an average load of 8,000 pounds of cargo per truck.[36]

Little progress was made in the development of night-capable tactical aviation during the three decades between World War II and the end of the Vietnam War. Nor would the remainder of the 1970s see a marked improvement. In June 1978 Lt Gen Howard Fish, the Air Force assistant vice chief of staff, identified the same deficiency in night attack capability in modern NATO that Allied airmen had seen during the war against Hitler.[37] The real impact of this deficiency can be realized when you consider that the weather in northern Germany during January averages less than 8.5 hours of daylight per day. Of this short period, only 6.3 hours per day have the mandatory 1,000-foot ceiling and

three-mile horizontal visibility that tactical aircraft without specific night capability require.[38] Tactical air power did not have clear weather for nearly 75 percent of the day.

Fortunately, technology finally caught up with required capability during the mid-1980s. As was amply demonstrated by the joint Air Force–Navy actions against Libya during Operation El Dorado Canyon in 1986, air power has achieved an initial capability to hit isolated targets with pinpoint accuracy at night. An excellent demonstration of this capability was shown by the crew of the F-111 that, armed with a Pave Tack infrared acquisition and targeting pod and 500-pound bombs, obliterated an Ilyushin Il-76 Candid jet transport on the ramp at Tripoli airport.[39]

Nor is the Air Force alone in new night tactical air warfare capability. While the Air Force F-111s attacked the airfield, the Sidi Bilal naval training base, and the Azziyah barracks in Tripoli, Navy A-6s equipped with both infrared and low-light-level sensors destroyed the Benina military airfield and the terrorist training barracks at Benghazi.[40] The technical capability for precision-night operations that airmen had been seeking for over 40 years had finally arrived.

El Dorado Canyon can be considered significant for more than just the precision-night capability. It was an excellent example of the proper integration of joint assets for mission accomplishment. To achieve tactical surprise and minimize US losses, the attack was planned to hit all five selected targets during the hours of darkness. To minimize collateral damage, but ensure optimum target destruction, precision guided bombs were specified. The only aircraft that the Navy had that could do this mission was the A-6E Grumman Intruder. However, between the two carriers in the area, the *Coral Sea* and the *America*, the Navy had only a total of 18 A-6s, not a sufficient number to hit all five targets simultaneously.[41] The choice was to either reduce the number of targets or provide extra aircraft with precision-night-attack capability. In a reverse of the Korean experience in which Navy and Marine aircraft provided extra aircraft to augment Air Force assets, in El Dorado Canyon the Air Force provided F-111s from bases in the United Kingdom to augment the Navy forces already on the scene.

Meanwhile, carrier-based F-14s, F/A-18s, and E-2Cs provided air superiority combat air patrol (CAP), suppression of enemy air defenses (SEAD), and airborne command and control support for both Air Force and Navy attacks.[42] The end result was the successful attack of all five targets with the loss of only one F-111—a well-run, highly successful joint night operation by any measure.

To judge from the unclassified information that is available through the Cable News Network (CNN) and various newspaper agencies, Operations Desert Shield/Desert Storm appear to be an even greater example of a successful joint night air war. Joint operations were established from the start of Operation Desert Shield. As Gen Colin Powell, chairman of the Joint Chiefs of Staff, explained in his televised briefing on 8 August 1990, US Navy assets provided initial air cover for Air Force and Army forces that were deploying into Saudi Arabia. En route Air Force F-15s and transport aircraft carrying the 82d Airborne Division to Saudi Arabia were vulnerable to Iraqi fighter attack in flight. Once on the ground, US forces would still be vulnerable to Iraqi attack on the airfield until the fighters could be refueled and manned by fresh pilots. Navy F-14s and F-18s operating from aircraft carriers in the Red Sea provided initial air cover until the Air Force F-15s were in place and combat ready.[43]

This same principle of joint operations was carried to an even greater degree during Operation Desert Storm. Air Force F-111s, F-117s, and F-15Es, Navy and Marine A-6Es and F/A-18s, plus British, French, and Italian Tornados worked together in an integrated air campaign that devastated Iraq's offensive military capability.

Substantive lessons learned are not yet available, but some trends appear to be emerging. First, some of the coordination problems inherent in joint operations have been resolved by the designation of Lt Gen Charles Horner as the joint forces air component commander (JFACC) for all air assets. As General Horner mentioned in his 17 January 1991 press briefing, all air missions were published and distributed in a single daily ATO.[44] The use of a joint ATO is an important improvement over our practices during the Vietnam War in which each service had its own daily air plan. By publishing a single

ATO under the command and control of a single air component commander, Desert Storm can minimize the problem of one aircraft bombing a target that a previous aircraft had already destroyed or, even worse, no one hitting a target on the assumption that "the other guy will do it."

A second trend of Desert Storm appears to be single aircraft attacks on a target, not formation attacks. Apparently each individual target is being bombed by a single aircraft at a time, not by simultaneous attacks on the same aim point. For instance, the videotapes that General Horner showed of the F-111 laser guided bomb attack against the chemical weapons storage bunker and the F-117 bombing of the Iraqi air force headquarters building both appear to be single aircraft missions.[45] Whether sequential attacks were made by another aircraft separated by TOT or simultaneous attacks were made against physically separated aim points on the same general target has not yet been revealed. Nor is there any information as to whether Air Force and Navy aircraft are attacking the same target at different times or attacking geographically separated target areas, as was done with the route pack system in Vietnam. These are important mission areas that should be investigated for lessons learned as soon as it is operationally feasible.

There is one important fact that was evident in Operation Desert Storm. The night campaign was a total effort in all mission areas. Even at night, the attacking bombers were protected by fighter CAP and SEAD aircraft. Unlike the normal practice during the Vietnam War, CAP and SEAD assets were tasked for joint missions, not assigned to cover only their particular service. The designation of General Horner as the single JFACC made this the most efficient use of air power possible.

Summary

This chapter has provided a brief overview of the history of both joint and night tactical air operations from World War II through the present. Limitations on joint operations have been caused by conflicts in doctrine

or a lack of realistic training in joint operations. By contrast, limitations and problems with night tactical air power have been the result of technical limitations and the nonavailability of the necessary equipment. Despite these problems, joint night operations in time of actual combat have proven successful, as was demonstrated by the Air Force–Marine Corps teams in Korea and the Air Force–Navy teamwork in Libya. The preliminary reports from Operation Desert Storm emphasized that given enough preparation time, we *can* operate successfully as a joint team. The next chapter discusses the current challenges to continued joint success in the night air war.

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Chapter 2

Doing It in the Dark—The Challenge

Chapter 1 examined the history of both joint operations and night operations. This chapter discusses some of the challenges to conducting joint night air warfare with the equipment available today. To help the reader better understand the assets and their possible employment, this chapter presents a hypothetical joint night operation code-named Operation Tae Kwon Do. The operation, to be conducted on the Korean Peninsula, uses land- and carrier-based aircraft plus Army helicopters to support a ground attack. The scenarios described in Operation Tae Kwon Do are by no means meant to be exhaustive descriptions of joint operations but merely serve as examples of how multiservice assets may be employed.

While reading this chapter, please note that this entire operation is strictly a figment of the author's imagination. Although physical descriptions of enemy and friendly air orders of battle and their capabilities are realistic, they are based on unclassified information only. Actual performance or employment tactics may be markedly different. The friendly assets listed are based on current US inventory and may not actually be available for employment in Korea. The North Korean airfield described and the attack itself are purely fictional and are not based on any actual plans that the author has read or is aware of. All other place names are selected at random from an atlas of the Korean Peninsula (fig. 1). Finally, such an operation would probably include combined operations with US and allied nations' forces. For ease of discussion, Operation Tae Kwon Do will include US forces only and not the combined forces of allied nations.

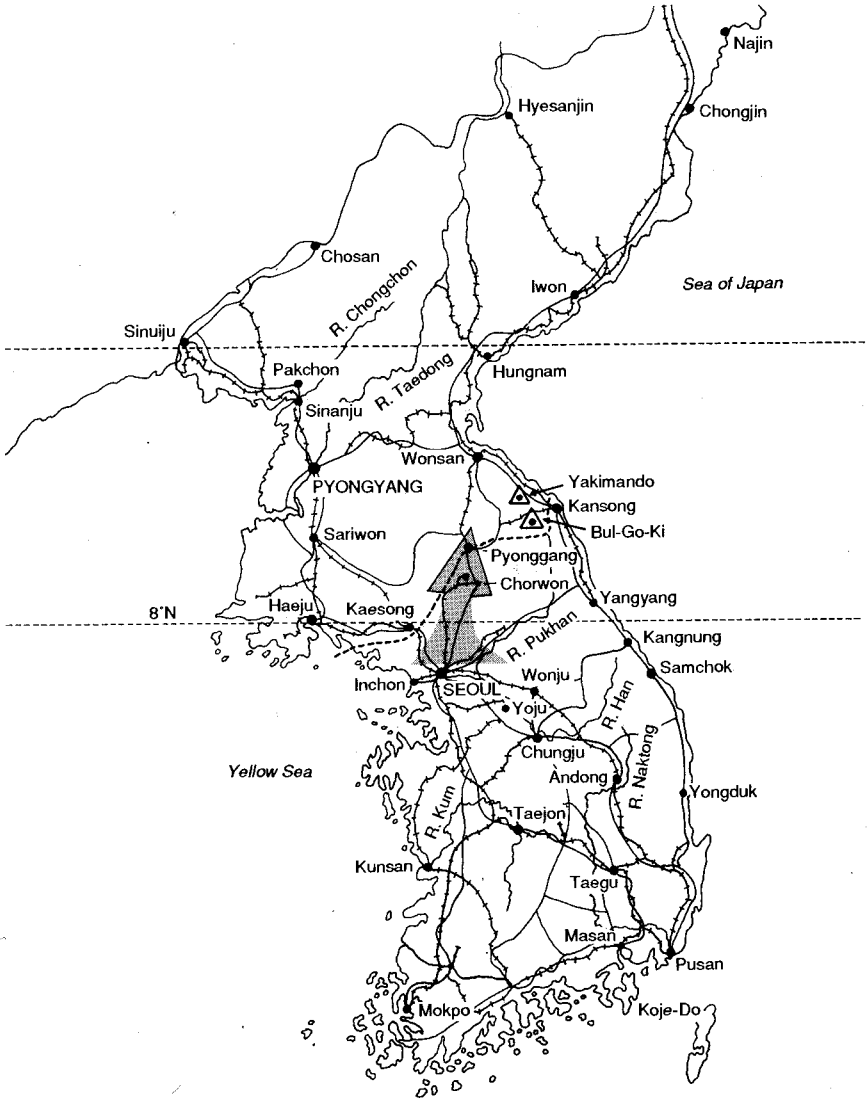


Figure 1. The Korean Peninsula and Operation Tae Kwon Do

Operation Tae Kwon Do

For purposes of this discussion, and to make the example more realistic, let us assume that open conflict erupted between North Korea and South Korea less than 48 hours ago. The United States finds itself in a situation similar to that which we faced in June 1950. North Korean (NK) forces are attacking all along the border with South Korea. So far, US and Republic of Korea (ROK) forces are holding their defensive positions but must take action soon to regain the initiative and avoid being overrun.

The commander in chief United Nations Command (CINCUNC) plans to regain the initiative through Operation Tae Kwon Do, a counteroffensive drive by elements of the US Army 2d Infantry Division north from Chorwon along the main road system to the port of Wonsan. The ground offensive is to be supported by Air Force, Navy, and Marine air attacks, plus organic aviation assets of the 2d Division. Operations are scheduled to commence at H-hour, 4:00 A.M. local time (0400L), tomorrow (D day).

Unlike the situation in Operations Desert Shield/Desert Storm, the attack by North Korea has caught US forces by surprise. They have not had five months to deploy forces into the theater. Additional air and ground forces are deploying from the Continental United States (CONUS) bases, but they will not arrive in time to support the initial attack; only PACOM theater assets are in place for the attack. These include the Army and Air Force units permanently stationed in Korea, Air Force and Marine air units deployed in from Okinawa and Japan, and US Navy Carrier Air Wing 11 (CVW-11) aboard the USS *Abraham Lincoln*, currently operating in the Sea of Japan. The USS *Midway*, normally based in Japan, is undergoing refit from its last deployment and will not be under way for at least 96 hours.

The ground forces are directly opposed by three North Korean armored divisions at Pyongyang. Enemy air order of battle includes a wing of ground attack MiG-27 Flogger Ds at Bul-Go-Ki AB and a wing of air-to-air MiG-23 Flogger Es at Yakimando AB, both in the vicinity of Wonsan.

A major threat to the success of this counteroffensive is the wing of NK ground attack MiG-27 Flogger Ds at Bul-Go-Ki AB. This is on the east coast of North Korea, 30 miles north of the demilitarized zone (DMZ) and 15 miles inland. It is within range of USAF bases in South Korea and US Navy carrier-based air in the Sea of Japan, but beyond the range of friendly artillery or naval gunfire.

In support of the ground phase of Operation Tae Kwon Do, CINCUNC has directed the air component commander to accomplish the following missions, not necessarily in order of priority:

1. Conduct offensive counterair (OCA) operations to neutralize Bul-Go-Ki AB for at least 12 hours, from 0400L to 1600L on D day.
2. Provide DCA as required against the MiG-23s out of Yakimando and whatever MiG-27s may survive the attack on Bul-Go-Ki.
3. Provide CAS for the initial ground offensive as required.

Readers with a knowledge of air power will recognize that there are some significant omissions in the total support that air power could provide for Operation Tae Kwon Do. For instance, there is no mention of a strategic bombing phase; no requirement to destroy North Korea's command, control, and communications nets; and no consideration of air interdiction to prevent possible reinforcement of the ground divisions. Similarly, the reader should note in the ensuing discussion that not all available aircraft will be tasked for the specific missions listed above. It is not the author's intent to imply that those aircraft not specifically selected for the OCA, DCA, or CAS missions described would not be used at all. Rather, they would be available and would be tasked for other missions, such as interdiction, that this section does not discuss. Operation Tae Kwon Do is not meant to be an exhaustive discussion of the definitive joint night air campaign but merely an illustration of some of the challenges that can be encountered in such operations. To that end and in the interests of brevity, this section is deliberately limited in scope to the OCA, DCA, and CAS missions.

For purposes of internal consistency, the missions will be discussed in the order presented above. The reader should bear in mind, however, that in practice the missions would not necessarily be executed in that

order. The OCA mission against Bul-Go-Ki is considered first because of the complexity of the mission and the size of the mission package required. Many of the mission elements and requirements of this OCA mission will be repeated to a lesser degree as parts of the DCA and CAS missions. To avoid repetition and for the sake of brevity, the discussion of the DCA and the CAS missions will be brief and will emphasize only those areas that are different from the OCA mission. This abbreviated treatment, however, is not meant to indicate that the DCA and CAS missions are any less important.

The various air missions of Operation Tae Kwon Do will be considered in two parts, mission planning and mission execution. Mission execution will be further broken down into three main phases: (1) ingress to the target area, (2) target acquisition and attack, and (3) egress from the target area and return to friendly territory.

Total air assets available to the air component commander are listed in table 1. The bases listed are the normal bases, not the wartime locations of the aircraft.

Table 1

Available Assets for Operation Tae Kwon Do

Aircraft	*Base*	*Mission(s)*
USAF		
F-15C/D	Kadena, Okinawa	Air-to-Air
F-15C/D	Elmendorf, Alaska	Air-to-Air
F-15E*	Elmendorf, Alaska	Multirole
F-16C/D	Misawa, Japan	Multirole
F-16C/D	Kunsan, Korea	Multirole
F-16 (LANTIRN)*	Osan, Korea	Multirole
F-16 (LANTIRN)*	Eielson, Alaska	Multirole
A-10	Eielson, Alaska	CAS

*Aircraft equipped and aircrew trained for normal employment in night missions.

Table I—Continued

Aircraft	*Base*	*Mission(s)*
USN		
F-14	USS *Abraham Lincoln*	Air-to-Air
A-6E*	USS *Abraham Lincoln*	Surface Attack
F/A-18*	USS *Abraham Lincoln*	Multirole
EA-6B*	USS *Abraham Lincoln*	SEAD
USMC		
AV-8B*	Marine Corps Air Station (MCAS), Iwakuni, Japan	CAS
F/A-18*	MCAS, Iwakuni, Japan	Multirole
USA		
AH-64 Apache*		CAS/Battlefield Air Interdiction
OH-58D Kiowa*		FAC/ Observation

*Aircraft equipped and aircrew trained for normal employment in night missions.

Mission Planning

A major purpose of mission planning is to select the appropriate type and number of aircraft for a mission package. The package must be sized and equipped to deal with all aspects of the mission, including ingress to the target area through the enemy's integrated air defense system (IADS), target acquisition and attack, and safe return to base. Because of the diversity of missions to be accomplished simultaneously and the scarcity of air assets available, each of the mission packages must be chosen to make both effective and efficient use of available resources. These considerations are defined in the complementary principles of war known as mass and economy of force. The package must have sufficient power to accomplish the objective (mass) but must not be so large as to waste scarce air resources on secondary objectives or "overkill" (economy of force).[1]

Offensive Counterair

As described in AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, and as proven by historical experience, the first objective for air power is to control the aerospace environment.[2] This is described as counterair, a general mission that is divided into three specific missions: defensive counterair, offensive counterair, and suppression of enemy air defenses (SEAD).[3]

As the name implies, DCA missions are designed to protect friendly assets—either ground, naval, or air—against enemy aerospace forces.[4] This can be accomplished with interceptors, antiaircraft artillery, surface-to-air missiles (SAM), or some combination of the three. The classic example of a DCA operation was the RAF's defeat of the Luftwaffe in 1940 during the Battle of Britain.

By contrast, an OCA mission seizes the initiative from the enemy to "seek out and neutralize or destroy enemy aerospace forces at a time and place of our choosing." [5] This may involve offensive fighter sweeps for air-to-air combat or air-to-surface bombing attacks against enemy airfields and aircraft on the ground. The classic example of an OCA operation was the Israeli air force's destruction of the Egyptian air force on the ground in the opening hours of the Six-Day War in 1967.

The SEAD mission "allows friendly aerospace forces to perform their other missions effectively without interference from enemy air defenses." [6] It requires successful negation of the enemy's IADS, a combination of warning radars, enemy fighter aircraft, SAMs, and AAA. This can be done through either electronic disruption of the IADS radar and communication systems or physical destruction of the individual component parts. The opening phases of Operation Desert Storm, including the electronic jamming of the Iraqi radar nets and the F-4G destruction of the SAM radars, illustrated a very well-planned SEAD operation.

Note that in the above mission descriptions there is no differentiation as to either the type of aircraft to be used or the time of day. A daylight airfield attack using B-52s is just as much an OCA mission as is a night attack against the same airfield using F-111s. The mission is defined by the objectives to be accomplished,

not by the capabilities and tactics of the aircraft to be used. The decision for daylight or night attack is driven by the threat to be faced and the aircraft available, not by the mission to be accomplished.

An OCA mission against an enemy airfield is one of the most difficult types to plan because of the diversity of threats that will be faced and the tasks that must be performed to accomplish the mission. The mission requires that an aircraft penetrate behind enemy lines, find and attack a target in the face of enemy defenses, and then return to friendly lines while avoiding pursuit. Obviously, some aircraft must carry bombs to attack the airfield and the aircraft on it (OCA). The package must also include protection against enemy defenses on the ground (SEAD) and protection from enemy fighters in the air (escort).

Planning for any tactical mission starts with the mission objective and target description. The objective in this case is to neutralize Bul-Go-Ki AB for the next 12 hours. Note that this does not necessarily require complete destruction of the target, just putting it out of action for a finite period of time. Bul-Go-Ki AB has a single runway with parallel taxiway oriented west-to-east. It is bordered on the south and west by mountains and on the north and east by lowlands leading to the Sea of Japan. A wing of MiG-27 Flogger-D aircraft is dispersed in hardened shelters throughout the field. The field is defended by a mixture of fixed and mobile AAA with both radar and optical aiming. Yakimando AB, approximately 20 miles north of Bul-Go-Ki, has a wing of MiG-23 Flogger Es on air defense alert. Intelligence confirms four of the MiG-23 aircraft on five-minute alert and an additional 20 available within 30 minutes.

Exact tactics and weapons for this type of mission are varied. At the low end of the spectrum, a Special Forces team is inserted on base to capture or kill all the MiG pilots in their sleep. The high end of the spectrum could be a Minuteman III nuclear missile launched from Montana. It is not the purpose of this section, however, to engage in a prolonged debate on OCA tactics. Therefore, for purposes of this example, mission planners have chosen to crater the runway, taxiway, and selected choke points on the airfield to prevent

the MiGs from taking off. The aircraft themselves are too dispersed and too well protected by their shelters to be feasible targets. To ensure sufficient accuracy and bomb damage to close the field, the attackers will be loaded with precision guided munitions, specifically improved 2,000-pound Mark-84s with Paveway III laser-guidance packages. This munition is commonly known as either a GBU-27 or laser guided bomb (LGB).

Working backward from the target itself, the next step is to determine how to defeat the enemy threat that would prevent accomplishment of the mission. In this case, the threat is the MiG-23s on alert at Yakimando, plus the AAA and the SAM sites at Bul-Go-Ki. The MiGs can be countered by escort fighters, self-protection with onboard weapons, or preemptive strikes against the airfield. The SAM and AAA can be destroyed by dropping bombs on the sites themselves or by destroying their controlling radar systems with high-speed antiradiation missiles (HARM). The defenses could also be avoided by going below their minimum altitude (for visual AAA, that is zero feet) or deceived through the use of electronic warfare (EW) assets. For purposes of this example, the air component commander has decided to follow General Horner's example in Operation Desert Storm and provide escort fighters and SEAD assets for the attack package.

Having considered the target and the threat, the next point to consider is the time for the attack. Lacking any other mission considerations, planners must select the TOT that would provide the greatest possibility of hitting the target with a minimal amount of risk to the aircrew. In this case, however, mission considerations dictate that the air attack must coincide with CINCUNC's counteroffensive at 0400L, D day. This requires a night attack against Bul-Go-Ki.

Luckily, in addition to best meeting CINCUNC's objectives, a night attack has certain tactical advantages. Target acquisition and attack is usually better during daylight when the target can be seen with the human eye. Unfortunately, the same daylight that makes the target visible to the attacker makes the attacking aircraft visible to the ground defenders. In daylight, defenders are not restricted to radar-aimed weapons but can also use optically aimed AAA and SAMs. By contrast,

force protection is usually greater at night because the enemy has less opportunity to see attacking aircraft and less available weapons to shoot at them. Even when the enemy detects the attackers, a night attack limits the enemy defense capability. One choice is to expend huge quantities of munitions in unaimed barrage fire in the hopes of hitting something. This was graphically demonstrated in the televised videotapes of action in the night sky over Baghdad on 17 January 1991. Alternatively, the enemy can attempt to improve the chances of hitting an attacker by using radar-aimed and guided SAMs and AAA. Radar guidance is vulnerable to either disruption by EW assets or destruction by Wild Weasels. When properly combined with a low-altitude approach to delay the possibility of radar detection, a night, low-level attack has an excellent chance of achieving tactical surprise and enhancing force survivability.

This possibility of achieving tactical surprise through a night attack undoubtedly contributed to the timing of Desert Storm. The political deadline for the start of military operations expired at 0800 local Iraqi time on 16 January 1991. Had Operation Desert Storm commenced then, approximately the first 10 hours of fighting would have been in broad daylight. Instead, the air attacks commenced at 0130L on 17 January, exploiting the tactical advantages of darkness with enough time to accomplish the opening phases of the air campaign before sunrise. This tactical advantage will also be exploited against Bul-Go-Ki.

Having set the mission objectives, threat, and general plan of attack, the next appropriate step is to determine what forces are available for this mission. The mission package will consist of four main components: (1) low-altitude, night-capable attack aircraft armed with LGBs; (2) escort fighters with air-to-air ordnance; (3) SEAD aircraft carrying HARMs; and (4) EW aircraft for radar jamming. Necessary supporting aircraft will include tankers for poststrike refueling and airborne warning and control system (AWACS) aircraft.

With that mission package in mind, we can look at what tactical aircraft are available in theater to support this mission. Again, this operation is deliberately limited to those forces that are present in PACOM on D day and does not include assets that may be en route from

CONUS. For that reason, aircraft such as the F-117, the F-111, the A-7, and the B-52 are not included. In-theater assets are assumed to have had time to deploy to the Korean Peninsula.

From that list of available assets in table 1, let us try to put a mission package together. To enhance tactical surprise and force survivability, only a single coordinated mission package will be used instead of successive attacks by several different mission packages over a period of time. If the CINCUNC were to follow the route package example of the Vietnam War, he would assign the mission to either the Air Force or the Navy based on area of responsibility. Because of the number of different tasks that must also be carried out in the total execution of Operation Tae Kwon Do, the use of route packages could cause a shortfall in one of the missions and a surplus of air in a different sector. A method that may provide more efficient use of available aircraft would be to consider the total amount of air power available and assign targets based on mission requirements, not geographical location. Although not a common employment practice, there is historical precedent for such a package. The most recent example for which unclassified information is available is Operation El Dorado Canyon, described in chapter 1. This system of joint use of the totality of air power is the planning method we will use in Operation Tae Kwon Do.

The first aircraft to be chosen will be the actual bomb carriers. The technical capabilities required for a night, low-altitude, LGB attack include either an infrared or low-light level sensor for target acquisition and designation, a terrain-following radar system for ground avoidance, and a laser target tracker and designator for bomb guidance. From table 1, the available aircraft with those capabilities are the F-16 and F-15E with LANTIRN, the A-6E, and the F/A-18. There are not enough of any one type of aircraft in the country to perform this mission with a single type aircraft. Therefore, two different bombers are selected—the F-15E and the F/A-18.

The F-15E is chosen as the lead aircraft because of its unique capabilities as a dual-role aircraft. Because of its advanced radar and air-to-air weapons (AIM-7, AIM-9, and gun), the F-15E can perform as a self-escorting aircraft. This increases the total mission package's

protection capability while keeping the package size at a minimal level. The fewer the aircraft, the less chance of them being detected by the enemy. As a bomb carrier, the F-15E can deliver and guide to impact its own LGBs. Using a tactic called "buddy-lasing," the F-15E can also designate a target for an aircraft that can carry LGBs but does not have a laser designator to guide the bomb into impact.[7] When faced with a limited number of laser-equipped aircraft, buddy-lasing can increase the number of LGBs on target by using nonlaser-equipped aircraft such as the F/A-18 as additional bomb carriers.

Both self-designation and buddy-lasing tactics are inherent capabilities of any laser-equipped aircraft, including the F-16 with LANTIRN and the A-6E. From his own experience in local training and Red Flag exercises, the author recognizes that even in the daytime, buddy-lasing in a high-threat environment is a highly demanding task that is better suited to a two-man aircraft. This allows the pilot to concentrate on flying the aircraft while the weapons system officer (WSO), or backseater, concentrates on designating the targets. The single-seat F-16, particularly in the night environment that this mission calls for, is less suited to be the designator aircraft than is the F-15E. Of course, the A-6E is a two-seat aircraft that could perform the buddy-lasing tactic, but this aircraft lacks the previously mentioned advanced air-to-air capability of the F-15E and would be less capable of self-defense on this mission. Further, the A-6E lacks the speed capability of the F-15E, increasing the flight time in enemy territory. Therefore, the tactically correct choice is the F-15E.

The choice of the F/A-18 as the second bomb carrier is driven primarily by its self-defense capabilities. Like the F-15E, it can carry and employ both the close-range, heat-seeking AIM-9 and the longer-range, radar-guided AIM-7 while still loaded with LGBs and external fuel tanks. The A-6E cannot carry the AIM-7. The F-16 can carry and employ the AIM-7 but does not have enough mounting points to carry the AIM-7, LGBs, and the necessary external fuel tanks at the same time. As an additional LGB platform, the F/A-18 is a better choice for this mission.

Having selected the bomb carriers, mission planners must next choose the escort aircraft. Any of the air-to-air or multirole aircraft listed in table 1 would be suitable for this mission during the daytime, when escort aircraft can expect air-to-air combat to include a combination of beyond visual range (BVR) intercept radar missile shots and close-in maneuvering for IR and gun shots. This is not necessarily true at night. According to Lt Col John ("Lucky") Rivers, an experienced F-15 pilot and Fighter Weapons Instructor Course (FWIC) graduate, night air-to-air combat will probably be all BVR, nonturning engagements. Although the FWIC syllabus included some training in night air-to-air maneuvering, they do not realistically expect to have to employ those skills since no other air force trains in that environment.[8]

Colonel Rivers's views agree with those of Lt Col Mel Copeland, another experienced F-15 pilot and former commander of the 54th Tactical Fighter Squadron, an F-15C air superiority squadron at Elmendorf AFB, Alaska. Colonel Copeland also expects that night air superiority will be primarily BVR and will require both launch-and-leave missile capability and "big-picture" (situational) awareness.

Launch-and-leave missiles, such as provided by the advanced medium-range air-to-air missile (AMRAAM) now being fielded, are necessary so that the escort fighters are free to maneuver after firing either to avoid being shot themselves or to attack following targets. Postlaunch radar guidance requirements of the current AIM-7 missiles limit the F-15's freedom to maneuver.

The concept of situational awareness refers to the ability of the fighter pilot to keep track of the position of his aircraft in space, the position of both friendly and enemy aircraft relative to his own aircraft, and the state of the air battle at that moment, plus a reasonable prediction of the next moment. Situational awareness requires a nearly instinctive knowledge of which enemy aircraft can be attacked, which ones may be attacking, and the capability of dealing with the enemy attack. The pilot must make decisions and take action quickly in the face of a constantly changing situation while continuing to fly the aircraft, talk on the radio, and (hopefully) shoot down MiGs. In either day or night, the pilot builds mental situational awareness through the use of onboard

radar, radio communication with other aircraft, and external support assets such as airborne or surface radar controllers. During the day, this mental picture is increased and confirmed by visual references. This can be done by either physically seeing the other aircraft or by reference to visible landmarks. At night, external visual situational awareness is extremely limited, forcing the aircrew to rely on onboard displays and mental images from radio calls.

Some form of big-picture display inside the cockpit is necessary so that the escort fighters can quickly determine where the fight is, where the friendlies are in relation to the target, and which of the radar returns are the enemy. At present, this situational awareness is provided in the F-15 and the F-16 by a combination of onboard radar and radio voice communications with the ground or airborne radar controller. Preferably, this big picture should be a real-time, in-cockpit visual display to cut down on the number of radio transmissions. In daytime, some of this situational awareness can be provided by visual cues outside the cockpit. There are no such visual references at night. Colonel Copeland considers that some form of internal big-picture display is absolutely essential for night air-to-air missions.[9]

Although not all of the mission results from Desert Storm have been declassified yet, at least one unclassified report validates Colonel Rivers's and Colonel Copeland's viewpoints concerning BVR ordnance and internal situational awareness. During a televised CNN interview, Capt Steve Tate, an F-15 pilot in Operation Desert Storm, related his experiences in the predawn hours of 17 January 1991. While flying as air cover for a number of allied attackers, Captain Tate's radar detected an unidentified aircraft heading toward his formation. Following confirmation by the allied air control system that the radar contact was a hostile Iraqi fighter, Captain Tate destroyed it with a single radar-guided AIM-7 missile. His first visual contact with the Iraqi target was the resulting fireball.[10]

Two important points should be noted from Captain Tate's engagement. First, as Colonel Rivers predicted, the entire fight took place without visual contact by either aircraft and with little or no maneuvering. A BVR missile shot was the key to Captain Tate's

success. Second, Colonel Copeland's points stressing the need for launch-and-leave ordnance and in-cockpit big picture are not invalidated. The fighter that Captain Tate destroyed was the only enemy aircraft in the area; Captain Tate could afford to keep illuminating the target until the AIM-7 hit. If there had been more enemy fighters airborne, one could have fired at Captain Tate while he was illuminating the first Iraqi. Launch-and-leave ordnance reduces this danger.

As regards the need for a big picture in the cockpit, Captain Tate used a combination of onboard radar and external control systems to confirm before firing that the radar contact was an enemy. Only one contact on his internal radar and clear radio communications with the external control system made this a comparatively easy thing to do. Multiple engagements from several different fighters might have overloaded both the control system and Captain Tate's situational awareness to the point that the Iraqi was never confirmed hostile and escaped.

The desirability of an internal, nonverbal big-picture capability can perhaps best be explained by the concept of "brain bytes." As explained by Capt Jane Patterson, an instructor/senior director in the E-3A AWACS, and Maj Dick Embry, a former F-106 and F-16 interceptor pilot currently flying the E-3A, both a radar controller and a fighter pilot only have so many brain bytes available to receive, process, and act on information. The radar controller receives information from the AWACS radar display and mentally processes it to determine if the radar contact is friend or foe. The controller then transmits this information to the fighter pilot for action. It takes a certain amount of brain bytes for the controller to do this verbally through radio communication and a corresponding amount for the fighter pilot to hear the transmission and decide to act on it. The pilot must be listening at the same time the controller is talking or must request a retransmittal. In contrast, if using a nonverbal data link (DL), the controller uses fewer brain bytes to transmit information in symbology to the fighter's internal displays. The pilot does not have to use brain bytes to form and say the necessary words, and the information can be sent more quickly. Since the DL symbology remains on the display, fighter pilots can receive and act upon it at their own pace. Meanwhile,

the radar controller can be transmitting DL to other fighters against other targets. From their personal experiences in both types of control systems, Captain Patterson and Major Embry state that the DL system is faster and easier to use for both controllers and the fighter pilots.[11]

From the list of aircraft in table 1, only the F-14 possesses the desired characteristics of launch-and-leave ordnance and in-cockpit big-picture (situational) awareness. The F-14's AIM-54 Phoenix air-to-air missile has the desired long-range, launch-and-leave capability that the AIM-7 does not. Even with AMRAAM, the F-15s, -16s, and -18s do not have the big picture that the F-14 has. The Tomcat's tactical information display, continuously updated by both onboard radar and either airborne or ground radar control DL, provides 360 degrees of real-time visual situational awareness to the aircrew. Therefore, the selected escort aircraft for this mission is the F-14 Tomcat. The number of F-14s required for this role can be kept to a minimum because of the self-defense capabilities of the bomb carriers. This reduces the overall size of the package while retaining sufficiency of firepower.

The next aircraft to be selected are the SEAD assets. The EA-6B is the only available in-theater aircraft capable of independently locating and destroying enemy threat radars. It also has the ability to electronically deceive and disrupt enemy radars through electronic jamming in addition to destroying them with HARMs. In the Air Force, this electronic jamming mission is performed by the EF-111A Raven. Unfortunately, they have not yet been deployed in theater; the EA-6B is part of the standard wing inventory on an aircraft carrier.

The EA-6B can also serve as the hunters in a hunter-killer team with other aircraft. Since there are only a limited number of the high-technology hunters in theater, pairing them with a suitable killer aircraft capable of HARM employment increases the overall SEAD protection for the whole package. The F-16, F/A-18, and A-6E are all capable of performing as SEAD killers. Since the EA-6B and the F/A-18 are both Navy aircraft and operate from the same aircraft carrier, any difficulties in mission planning and coordination are minimized by pairing the EA-6B with the F/A-18 as a SEAD hunter-killer team.

As was demonstrated in the opening minutes of Operation Desert Storm, the presence of the Army's night-capable attack helicopters can bring an interesting new SEAD asset to the theater. As was revealed in the 25 February 1991 issue of the *Air Force Times*, Army AH-64 Apache helicopters armed with laser guided Hellfire tactical air-to-surface missiles knocked out three Iraqi early-warning radars along the Saudi Arabian border at approximately 0130L, 17 January 1991, just as the first wave of USAF aircraft turned north from their holding points.[12] This opened a blind spot in the Iraqi coverage, allowing the first waves of F-15Es to cross into Iraq basically undetected. This was a superb example of the proper joint use of night-capable assets for overall mission success. Again following the lesson from Desert Storm, planning for Operation Tae Kwon Do will include joint SEAD employment with Army Apaches.

The proposed attack package against Bul-Go-Ki AB is listed in table 2. The author accepts that there are many other possible mixtures that may be as effective, or even more effective. However, since the purpose of the example is to illustrate potential challenges in joint night employment, the *form* of the example used is more important than the *substance*.

Table 2

Bul-Go-Ki OCA Mission Package

Aircraft	*Type*	*Armament*
Attack	F-15E with LANTIRN pods F/A-18 with FLIR pod	(both aircraft): GBU-27s, AIM-7, AIM-9, 20-mm gun
Escort Fighters	F-14	AIM-45 Phoenix, AIM-7, AIM-9, 20-mm gun
SEAD	EA-6B hunter-killer F/A-18 killer AH-64 Apache	HARM HARM, AIM-9, AIM-7 Hellfire, 30-mm gun

Table 2—Continued

Aircraft	*Type*	*Armament*
EW Support	EA-6B	

Legend:
AIM—air intercept missile
EW—electronic warfare
FLIR—forward looking infrared radar
HARM—high-speed antiradiation missile
LANTIRN—low-altitude navigation and targeting infrared at night
OCA—offensive counterair
SEAD—suppression of enemy air defense

Defensive Counterair

Defensive counterair missions are to "detect, identify, intercept, and destroy enemy aerospace forces that are attempting to attack friendly forces or penetrate friendly airspace."[13] DCA over the battlefield provides the ground troops with the freedom to carry out the ground war without interference from enemy air threats. DCA operations involve many of the same problems as faced by the escort aircraft for the OCA mission. DCA aircraft at night should still expect to employ BVR missile shots with minimal maneuvering and to depend on nonvisual methods for enemy detection and identification.

In some respects, though, the DCA role for this mission should be easier. The fighters escorting the OCA package against Bul-Go-Ki will expect to fight over enemy airspace. Under such conditions, they must be prepared to deal with a threat from any direction. In contrast, this DCA mission involves air operations over friendly lines, not penetration into enemy territory. This provides two important advantages. First, the threat of enemy SAMs and AAA is greatly reduced or nonexistent. By staying over our own territory and beyond the range of the enemy threat, we can eliminate the need for SEAD support, freeing those assets for other missions. Second, the bandits will probably be coming through airspace friendly to us from a single predictable direction (i.e., north).

Even though this mission still involves night operations, the DCA forces do not need the same big picture that the escort fighters required for the OCA mission against Bul-Go-Ki.

Based on the above considerations, any of the air-to-air or multirole fighters listed in table 1 could be appropriate for this mission. Although the multirole F-16s or F/A-18s could be tasked for DCA over the battlefield, the relative scarcity of assets for Operation Tae Kwon Do may make it necessary to save these multirole aircraft for either air interdiction (AI) or CAS. In contrast, because of aircraft design features, the air-to-air specialized F-15s and F-14s cannot be as effectively used for CAS or AI missions. Further, the F-15s and F-14s have the advantages of greater loiter time and greater missile capacity compared to the multirole aircraft. Therefore, either of these two aircraft is preferable to the multirole aircraft for the DCA over the battlefield. Since the F-14s have already been tasked to provide escort for the OCA mission against Bul-Go-Ki, the F-15s will be used for the DCA over the battlefield.

On-Call Close Air Support

The final mission area to consider for Operation Tae Kwon Do is the on-call CAS for the ground offensive. By definition, CAS supports "surface operations by attacking hostile targets in close proximity to friendly surface forces." Because of this "close proximity," CAS missions "require detailed coordination and integration" with friendly surface forces.[14] As was discussed in chapter 1, the traditional tactic for night CAS is to illuminate the target with aerial flares for bombing from medium altitude. In the face of today's high-threat air defenses, this tactic is probably a good way to ensure getting killed! The flares that illuminate the enemy target also serve to highlight the attacking aircraft and the friendly ground forces. Its superior capability to operate in the dark gives the American Army a tactical advantage for our soldiers.[15] Flares take away some of the night-fighting advantages such as surprise and concealment that American technology gives our ground troops. To survive in the night CAS role, an aircraft must have the same high-speed,

low-altitude capability of day CAS aircraft.[16] The night CAS pilot must fly at low level, be able to navigate to the target area, avoid the "rocks, trees, and boulders" along the way, identify the target, successfully attack it, then egress back to safety.

At first glance, these appear to be the same challenges faced on a night OCA mission, so any of the bombing aircraft listed in table 1 could be used in the CAS role. However, there are some important differences that can make one aircraft better suited than another to a night CAS role. The OCA mission is against a large target in a known position. (Runways do not tend to move around.) Because the position is known, attacks can be preplanned from an optimum axis so that the pilot can ensure target identification.

On-call CAS has some different requirements, however. Targets for on-call CAS are not identified until after the battle starts and therefore cannot be preplanned. An enemy tank platoon that suddenly comes out from under camouflage directly across the line of advance could require on-call CAS to clear the way. Typically, aircraft suitable for on-call CAS must be capable of quick response to reach the target area, have some system for positive target identification in the middle of a battle-confused environment, and bring a large variety and amount of ordnance. They should also have good maneuverability to stay close to an active battle area while avoiding enemy defenses and have reasonable loiter time to be able to stay and get the job done. The AH-64 Apache, the AV-8B Harrier II, and the A-10 Thunderbolt II (Warthog) are all designed for exactly these requirements. The Apache and the Harrier, with integral FLIR and night vision goggles (NVG), are especially well equipped for night CAS missions without external illumination. The A-10 has neither FLIR nor NVGs and normally requires external lighting such as air-dropped flares or artillery-fired illumination rounds for target identification and attack. However, recent experiences in Operation Desert Storm show that the Warthog can be effectively employed at night without illumination of the target by using the AGM-65D with imaging infrared (IIR) Maverick for both target acquisition and attack. Burning enemy vehicles from previous attacks

have also proven highly effective in illuminating the remainder of the convoy for subsequent attack.[17]

To follow the principle of mass, all three aircraft—the Apache, the Harrier, and the Warthog—will be tasked to provide on-call CAS at night for Operation Tae Kwon Do. As will be discussed in the execution section, the night CAS mission has some interesting challenges in the target acquisition and attack phase.

Mission Execution

With the packages selected, let us walk through the missions to see what challenges must be met during Operation Tae Kwon Do. As stated in chapter 1, this study focuses on those areas that are both joint and night operations. In keeping with this focus, the mission execution section of this chapter addresses only those areas that are peculiar to joint night operations.

There are a number of challenges in joint mission accomplishment, whether it is a day or night mission. For instance, how well does the Air Force ATO system pass assigned targets to the Navy squadrons involved? What process can land-based Air Force aircrews use for premission planning with carrier-based Navy aircrews? What are the correct start, taxi, and takeoff times for all the squadrons to ensure a properly coordinated attack? Since Navy aircraft can only aerial refuel off certain Air Force tankers and Air Force fighters cannot refuel off any Navy tankers, what are the required prestrike and poststrike refueling assets? All of these are important joint employment issues that must be resolved before the mission, but they are not peculiar to night operations. More important, they are all issues that are regularly practiced in local exercises, joint command post exercises, and such large-scale operations as Red Flag and Cope Thunder.

Offensive Counterair

By its nature, the OCA mission against Bul-Go-Ki is the largest and most complex of the three. Accordingly, it will encounter the largest number of challenges to joint night-mission accomplishment. The challenges considered are not meant to be exhaustive, nor is the order in which they are considered intended to reflect any particular mission priority. They are included simply to illustrate some of the areas in which joint night training can improve future operations.

Target Ingress. The first obstacle encountered during target ingress is penetration of the enemy IADS, beginning with the early warning and ground-controlled intercept radars. These are the systems that initially detect incoming aircraft and control the overall fighter, SAM, and AAA responses. EA-6Bs are available for passive disruption and deception of the IADS while they, in conjunction with F/A-18s and Apache helicopters, can be used for destruction.

There are two challenges to effective employment of this joint SEAD package. First, Army helicopters are organic to their assigned division. They do not normally come under the control of the air component commander and, as such, are not detailed in the daily ATO. The impact of this is that helicopter operations are usually planned independently and are not coordinated through the ATO system. In effect, they can become "wild cards," potentially operating in the same target area as fixed-wing aircraft but neither would have knowledge of the other's presence. And at night, with external lights off, they cannot depend on visual lookout to avoid each other.

The overall mission commander must have some way of finding out which units are supporting his or her package and coordinate with the aircrews for the exact times and location of the SEAD suppression. This challenge is relatively easy to overcome: include the Apaches in the ATO for coordination purposes. This will not require a change in the command and control relationship of the Army aviation but would require a firm commitment on a mission-by-mission basis to ensure that the SEAD support is there when needed. The challenge for the Air Force to include the Army in the ATO and for the Army to decipher and carry out the ATO are suitable subjects of training.

The second challenge to the joint SEAD package is even more appropriate to training. This is the problem of communications, specifically the syndrome known as "what the captain means." Terminology that is familiar to one service may be totally without meaning to another service. For instance, the EA-6B is an extremely scarce and high-value air asset with a very limited capability to defend itself against enemy fighters. If MiGs are approaching missile firing range, AWACS will normally warn such aircraft to depart the threat area rather than risk being shot down. In Air Force terminology, the radio call for that action is "retrograde." However, in Navy parlance, retrograde has no meaning. The Navy terms are *fade* or *scram*, depending on the range of the threat.[18] The wrong radio call at the wrong time is at best confusing and at worst lethal. Again, the challenge can be met with relative ease through joint training. But without such training, we may not even be aware of the language differences.

The next obstacle in target ingress is the enemy air-to-air threat. The mission elements in tables 1 and 2 were selected for their self-protection air-to-air capability. Proper use of this capability requires the maximum possible situational awareness for all aircraft to increase force survival and to avoid fratricide. For instance, if the bombers know that the radar contact heading toward them is a MiG-23 that slipped past the escorting F-14s, they can eliminate the threat with an AIM-7 in the face of the MiG. However, if the bombers are confused as to whether the radar contact is a hostile MiG or an egressing SEAD aircraft, they will be forced to hold their fire, allowing the possible threat too close to firing parameters. The key to this challenge is having the most accurate situational awareness possible.

The escorting Tomcats can maximize their situational awareness with onboard radar and external DL signals from either surface or airborne radar control systems. The Air Force bombers and SEAD aircraft cannot receive this same DL; they are dependent upon onboard radar and voice radio communications to build their situational awareness. The equipment limitations that prevent joint use of the DL display cannot be solved by joint training. However, building situational awareness

through voice radio communications, particularly in joint operations, can be improved by joint training.

Achieving a big picture is an additive process in which the total situational awareness of the mission package and of each package member can be increased by all elements monitoring the same radio channels. By listening to the radio calls between the escort fighters, the bombers and SEAD aircraft can form a mental image of where the bandits are and what areas to avoid. "Bandits over Herman's manor" is a very common call at Cope Thunder that alerts everybody where to head for a piece of the action. Alternatively, from the calls of the SEAD and bomber aircraft, the escorts can build their own situational awareness as to where some bandits got through, which formation needs help, and when the escorts can go home because the friendlies have all safely egressed. "Last friendly off target" opens up the target area as a free-fire zone since any radar contact in that area must now be a bandit. Each individual piece of information can be processed into a clearer big picture.

This will only work, though, if all elements on the net are using the same terminology. Unfortunately, just as was the case with the terms *retrograde* and *fade/scram*, there is no strict commonality of terms between the services, nor is there universal recognition of where the terminology may be different. Two short examples will serve to illustrate this point.

Example One—Air Force Fighter, Navy AWACS. The first example involves an Air Force F-15E (Eagle 1) receiving voice threat warnings from a Navy E-2C AWACS (Hawkeye). Voice calls are necessary because the Air Force aircraft cannot receive the E-2C's DL:

Hawkeye to Eagle: "Multiple bandits, 25 miles and closing."

Hawkeye has just warned Eagle 1 of enemy fighters coming toward the latter. Eagle then looks into his or her own radar scope, detects two separate contacts coming toward his or her aircraft, and transmits to Hawkeye: "Reno two, judy angle."

In Air Force terminology, this means that Eagle 1 can distinguish two separate contacts ("Reno two") and is turning to counter the threat

("judy angle"). As such, Hawkeye is relieved from any more calls as to the direction of the MiGs, but should keep Eagle 1 advised as to their range. This serves as a mental prompt to Eagle 1 as to how close they are getting to shooting at each other. Simple, right? Unfortunately, not in this case. In Navy terminology, *Reno* has no meaning. It is an unfamiliar term that adds to confusion. Worse, *judy angle* can have the wrong meaning. *Judy* by itself, is a common term to both Air Force and Navy that means the fighter is taking control of the intercept and the AWACS should cease *all* transmissions. *Judy angle* is only an Air Force term; it is not used in Navy parlance, and it is possible that the Hawkeye controller has never heard it before. If Hawkeye gets confused by Eagle's call, it is conceivable that Hawkeye will think *judy angle* means the same thing as *judy* and stop all radio calls. This would leave Eagle without a vital piece of information—the range to the target.

Example Two—Air Force Fighter, Navy Fighter. The second example involves Eagle 1, an F-15E on the OCA mission, and Hornet 1, an F/A-18 flying as his or her wingman:

Eagle to Hornet: "Contact on the nose, high aspect."

Aspect is verbal shorthand for *aspect angle*, a term expressing the angular relationship between a target aircraft and your fighter. In Air Force terminology, aspect angle is defined as where you are in relation to the target's tail, taking into account the target's heading. It is expressed in increasing angles from 0 to 180 degrees beginning at the tail of the enemy aircraft to the position of your aircraft (fig. 2). Thus, in Air Force terminology, *high aspect* means the radar contact is coming toward you and could be a threat. The Navy, however, defines aspect angle as where you are in relation to the *nose*, not the tail of the target. To the Navy, high aspect means the target is going away from you, not coming toward you. You can derive exactly the opposite meaning of the information provided because of an unknown difference in terminology.[19]

Could these same problems occur during joint day operations? Of course. The radio terminology would still cause confusion. However,

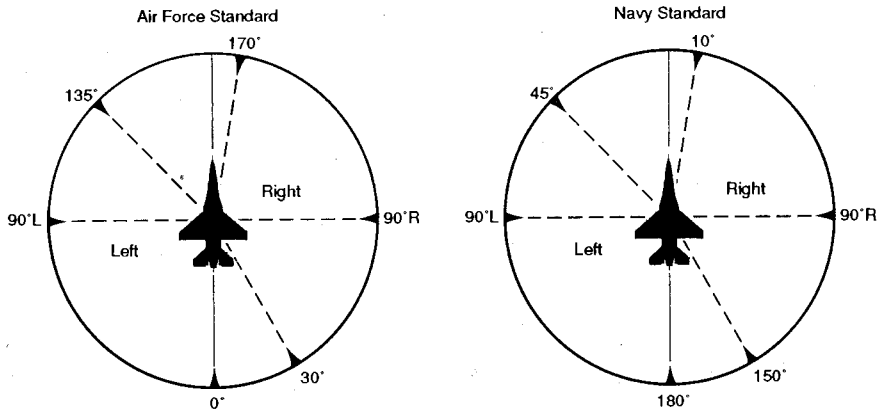


Figure 2. Aspect Angle

the confusion would be magnified by the other problems of flying at night. Without daylight visual references, more of your attention must be devoted to flying the jet, leaving less time to study other sensors such as air-to-air radar. Since the F-15E is a two-seat aircraft, the backseater may not need range calls from Hawkeye. The F/A-18 pilot, even at night, may have the time to study his or her radar in more detail and come to the right conclusion. But it will take more time and concentration to sort through the confusion than during the day. Although joint daylight training may point out some of these confusion factors, the full impact of these factors on night operations may not be recognized because of this natural tendency to adapt and work through the confusion. These examples pose real challenges to joint operations in a dynamic combat environment. They are simple, but by no means minor problems. Such problems can and should be identified and solved through common experience and joint peacetime training before they can become big (albeit simple)

problems in wartime operations. The next war might not have five months of preparation time before the shooting begins.

The next challenge to be considered for this mission is what formation should be flown? During daylight operations, the most common formation is a widespread, line-abreast formation for mutual protection. This formation requires the wingman to maintain visual contact with the leader either directly to the right or directly to the left. In this manner, each pilot can detect a threat to the other aircraft and turn to help defeat it. In daylight, the wingman can easily see the lead aircraft, but this visual contact is quickly lost at night. In peacetime, at night, the lead's external position lights would be on, giving the wingman a point of reference. In wartime, to maximize surprise, the night fighters would not turn on their lights.[20] The wingman, not having these external cues to keep sight of the lead, would have to depend upon some internal sensor to maintain formation. This is a capability that the fixed forward-looking sensors of Air Force night fighters in use today cannot provide. Therefore, Air Force units frequently train for trail formations in which the wingman can maintain sensor contact with the lead aircraft with forward-looking radar (FLR) and FLIR.[21]

There are at least three drawbacks to such trail formations. First, it tends to lengthen the attack package into a "bomber stream," with a specified minimum spacing between aircraft to ensure that the trailing aircraft do not fly through the fragmentation pattern of the bombs dropped by the previous aircraft. This minimum interval between aircraft increases total mission package exposure time behind enemy lines. Since the escort fighters must provide cover from the time the first bomber crosses into enemy territory until the last one leaves, this "vulnerability window" can be a critical factor. If the window exceeds the fuel supply of the escorts, either sequential escorts must be provided or some bombers must be left exposed.

The second drawback to a bomber stream is the element of attack predictability. The first man through highlights the remainder of the package for the defenders. The third drawback is that in order to maintain formation, the entire package must limit its maximum speed to the maximum speed of the slowest member in the formation. This

may be considerably less than the desired employment speed of the other aircraft, resulting in a mission compromise that does not really meet anybody's desires.

Unlike current Air Force aircraft, Navy night fighters are equipped with helmet-mounted night vision goggles. Since NVGs move with the pilot's head, they are not fixed to forward view only. This may provide some capability for maintaining line-abreast formation at night, even without external lights on the leader's aircraft. This could cut the vulnerability window at least in half. It may even be possible to use the NVGs for ingress other than a single route bomber stream. Because NVGs are not limited to strictly straight ahead, the mission package might be able to use multiple parallel or intersecting ingress routes with lateral separation instead of depending solely on nose-to-tail separation.

Planners must decide if a night line-abreast formation is tactically preferable to a trail formation, what special techniques need to be used for either type of formation, or if neither formation is tactically feasible. These are all examples of the types of decisions that should be made in peacetime training and not postponed for wartime employment.

Target Acquisition and Attack. Assuming the joint package does not become lost, separated, or destroyed somewhere en route, target area tactics are the next significant challenge. To a certain extent, ingress and egress routes can be deconflicted by choosing different flight paths. However, all paths ultimately converge at Bul-Go-Ki, where mutual deconfliction becomes a big problem, assuming a near-simultaneous time over target. If the SEAD aircraft go in first to suppress the SAMs and AAA and then depart the target area, how do they avoid running into the bombers that are coming into the target area? How do the bombers and escorts keep track of which radar contacts coming toward them are the egressing SEAD aircraft and which are attacking MiGs? If the SEAD aircraft remain in the target area to continue to keep the threat down, where do they fly to avoid running into the bombers or flying through the frag pattern from the exploding LGBs? What target attack route does the third element fly to avoid running into the first element? If target area deconfliction is based on timing and one of the

attackers is late, can he still drop his bombs on target or must he abort the attack?

The above questions are not peculiar to night operations but are made significantly more difficult by darkness. In daytime, most of these questions can be handled by the principles of "big sky, small airplane" and "see and avoid." If the egressing SEAD aircraft and ingressing bombers can visually acquire each other, they can quickly solve the identification and avoidance problems. Attack routes and timing must still be deconflicted to avoid fratricide, but they can be more flexible during the day. The late element can see if the other elements are in the way and possibly attack anyway.

Night, however, complicates things. As we learned in Operation El Dorado Canyon, strict dependence on timing deconfliction can cause aborted attacks if the timing is off. Adm William Crowe explained in testimony to the Senate concerning the pilot of an otherwise mission-capable F-111 who aborted his mission without ever reaching the target area:

> Since he was late he just aborted. The problem [with] coordination at night is you can't depend upon the eyeball at all. The coordination is all timing and routes. Once he got out of sequence, he didn't believe he should go in.[22]

One possible solution to handling this deconfliction problem is a large TOT window at night instead of a fixed TOT. This allows increased flexibility for unplanned mission delays, such as the avoidance of a MiG or SAM.[23] Such TOT windows, however, will increase the required coverage time for both the DCA and the SEAD aircraft and may exceed the possible time on station for the number of available aircraft. In such circumstances, spatial deconfliction (one aircraft hits the east end and another hits the west end of the runway) is better than time deconfliction.[24] Using spatial separation gets back to the problem of being able to see and avoid all the other players, or at least the ones in your area. Again, night makes it tougher.

Egress from the Target Area and Return to Friendly Territory. Once the attackers have dropped their bombs, the next challenge is how to get home. Unless the bombers are flying in close formation during

the bombing run (a viable tactic but not without training challenges of its own), they have probably become physically separated during the attack. Do you egress alone, or do you attempt to find a wingman? At night, without lights on, how do you find a wingman? Even if you see another airplane, how can you tell at a safe distance if it is friend or foe? If you plan to egress single ship, what route do you follow to avoid hitting other aircraft in the target area or to deconflict from follow-on attackers? How will the escort fighters and the SEAD aircraft know that they are clear to depart the target area?

Visual reference at night cannot be depended on to provide these answers. Extensive premission planning can analyze and answer these questions if the aircrews have the opportunity to do so. But with the operating bases of the different mission elements physically separated, such opportunities will be limited at best. If each member of the package is familiar with the others' capabilities, tactics, and limitations, the amount of premission coordination that is required may be reduced to what can be handled with a simple secure voice radio transmission. This could even be enhanced by a baseline set of agreed-upon standard employment techniques that, with minimal time, can be modified to fit the exact tactical situation. The key to making such a system work would be thorough familiarity through joint practice and training.

There is at least one other important aspect of joint night operations that the OCA portion of Operation Tae Kwon Do must plan for: How do you return through friendly defenses without getting shot down by your own side? Over land, the returning aircraft must penetrate the friendly fighters, missile zone, and even small arms fire from ground troops. Confusion between ingressing MiGs and egressing friendly aircraft can be sorted out with preplanned radar identification signals, established air routes through the defenses, or assigned altitudes for crossing friendly airspace. These last two techniques are commonly known as "safe passage procedures" and are frequently practiced in peacetime training programs at wing level and higher.

The presence of a naval force adds another dimension to the problem of avoiding being hit by friendly fire. For those portions of the ingress and egress routes that are over water, the friendlies must follow

specific "delousing" procedures and avoid overflying any US Navy ships or risk being fired upon. As was demonstrated in Operation El Dorado Canyon, there are at least two problems with this. First, the old problem of unfamiliar terminology. *Delousing* is a Navy term and procedure, totally without meaning to Air Force aircrews. Second, you cannot avoid overflying Navy ships in the dark when the Navy refuses to tell you where they are.[25] Although the delousing and ship deconfliction problems would still exist in the day, they are made greater at night because of the reduced capability to see and avoid. This is not an equipment problem, but a prime example of an operational challenge that can be overcome by familiarity with each other's procedures through joint training.

Defensive Counterair

The execution requirements for the defensive counterair mission of Operation Tae Kwon Do are considerably less complex than were the requirements for the OCA mission. Since DCA is conducted over friendly territory, target ingress and egress challenges are greatly simplified: get to the right piece of sky and stay there until you have to go home. There are, of course, challenges of nonstandard radio terminology if we are working with a joint control system to reach the assigned area, but these have already been addressed. Joint night DCA does, however, involve some challenges in the target acquisition and attack phase.

The major challenge to the night DCA mission is similar to the one faced by the OCA mission during egress. How do you sort out the good guys from the bad guys and avoid shooting the wrong ones? Changing classified identification friend or foe (IFF) radio signals that only friendly aircraft have the necessary equipment to transmit can help sort it out, but it will only show that a radar contact is a friendly. The presence of a correct IFF can demonstrate that the unknown is a friendly, but the absence of the correct signal does not automatically mean it is a hostile. Battle damage may prevent the friendly equipment from working correctly. Compliance with classified safe passage procedures,

sanctuary altitudes, and controlled crossing points all help to identify friend from foe. This greatly simplifies the DCA problem since high-speed radar contacts heading toward friendly airspace and not in compliance with safe passage procedures can be assumed to be hostile.

Joint DCA missions for Operation Tae Kwon Do involve additional challenge for target acquisition and attack—the presence of Army air defense artillery (ADA) for self-protection of the ground forces. There must be a positive command and control system to determine which enemy aircraft are engaged by friendly DCA aircraft and which are fired on by friendly SAMs or AAA. Firing on a single target by all three systems is an inefficient use of scarce weapons while not firing on the target by any weapon is noneffective. In the same vein, there must be a common joint identification system for Army ADA to avoid fratricide of recovering friendlies. In the day, this last problem can partially be alleviated by visual identification before firing. The ADA will not have this luxury at night.

All of these challenges can be overcome, but they will probably require frequent realistic training by all participants to avoid mistakes. Just as Air Force crews must be familiar with Navy delousing procedures if operating near ships, Navy crews must follow Air Force safe passage procedures if operating in an Air Force area of responsibility. And the DCA pilot must be trained in and be familiar with whichever system is in effect at that time and place. Both Air Force and Navy crews operating near ground forces must be thoroughly familiar with the ADA procedures, just as the missile operator must be trained in the appropriate IFF procedures. As was true before, the natural confusion that occurs at night magnifies the confusion that can be caused by joint operations. These are not equipment problems but training challenges.

On-Call Close Air Support

Like the DCA missions, on-call CAS missions have less complex target ingress and egress challenges since they are conducted primarily

over friendly lines. However, the target acquisition and attack phase is considerably more challenging, given the nature of the targets.

On-call CAS missions involve targets that are not identified until after the battle starts and, therefore, cannot be as well preplanned. An enemy tank platoon that suddenly comes out from under camouflage directly across the line of advance could require on-call CAS to clear the way. On-call CAS brings the added challenge of finding time-critical mobile targets, such as moving tanks, whose exact position is not always known to the pilot before takeoff. The attacking aircraft must then be directed to the target by a FAC, located either on the ground with the Army troops or in an airplane near the battle area. During the day, highly prominent terrain features (rivers, solitary hills, etc.), easily recognizable structures (towers), flashing mirrors, or colored smoke markers are all used as reference points from which the CAS pilot can be directed to the target. At night, such cues may not be visible if they are outside the field of view of the night-fighter's sensor equipment. This is particularly a problem for the F-15E and F-16 LANTIRN aircraft, which are equipped with a comparatively narrow field-of-view sensor that is optimized for use straight ahead but, unfortunately, not for the CAS mission. In the dynamic CAS environment, the pilot must be able to acquire and attack targets that may not be directly ahead of the aircraft. Since exact target location will probably not be known before reaching the target area, it may not be possible to preplan an attack axis that ensures the target is within a narrow forward-fixed field of view.[26]

Aircrews equipped with NVGs such as the Navy F/A-18 and the Marine F/A-18D and AV-8B have considerably less restricted fields of view. Since the NVGs look where the pilot's head looks, suitably equipped aircraft can acquire targets and reference points in positions other than straight ahead of the aircraft. The ability of the Air Force airborne FAC to recognize what the Marine AV-8B pilot can see or for the Army ground FAC to understand what things an Air Force F-16 pilot with LANTIRN can identify is a skill that can only be acquired through frequent realistic training.

A second critical skill in any CAS mission is how to sort out the friendlies from the enemy. Even in the daytime, this is not an easily

acquired skill, especially when using joint forces that may not have had the opportunity to practice together. During the 29 January 1991 night battle to retake the Saudi town of Khafji from an Iraqi armored force, an Air Force A-10 mistook a US Marine Corps light armored vehicle (LAV) for an Iraqi armored vehicle. The subsequent Maverick attack destroyed the LAV and resulted in seven Marines being killed by friendly fire.[27] Slightly more than two weeks later, a US Army Apache helicopter mistakenly destroyed one US Army Bradley infantry fighting vehicle and one US Army armored personnel carrier using Hellfire missiles during a night skirmish with Iraqi troops near the Saudi border.[28] Positive target identification in close air support, particularly at night, is a difficult problem. Some method of positively identifying targets from friendlies is a critical skill when a CAS mission is supporting ground troops in close proximity to the enemy.

Colored smoke, large fabric panels, even visual recognition of a particular tank silhouette are all daytime target identification techniques that are not suitable at night. But an enemy tank looks pretty much like a friendly tank when you can only see it as a monochromatic FLIR display. Infrared strobe lights to mark friendly positions or friendly equipment and troops marked with special low florescent camouflage that is visible in the NVGs but not to the naked eye are some suggestions of what might be feasible at night.

If the CAS aircraft is equipped with a laser-sensing display, such as the Pave Penny pods on some A-10 attack aircraft, then positive target identification can be made by an airborne or ground FAC using a laser to illuminate the target. Using this technique, either an airborne FAC in an Apache helicopter or a ground FAC with a man-portable ground laser locator designator (GLLD) illuminates the target with a specific laser code and frequency. (The latter option may be particularly desirable since the person on the ground has a better understanding of exactly where he or she needs the bombs to support the ground war.) When the Pave Penny system detects the reflected laser energy, it provides a target cue in the pilot's heads up display (HUD) to show target location. With this cue, the pilot can then point the airplane at the target and use the

IIR Maverick's sensor for final target acquisition and attack. If the HUD also can provide a FLIR display with the Pave Penny cue overlaid on it, the pilot could also attack with guns or nonprecision bombs.[29] Like any other skill, though, these target-identification (ID) techniques must be trained for by the forces that expect to employ them.

Mission Feasibility

At this point, it is appropriate to ask whether or not such a joint mission with both Air Force and Navy aircraft on a single target is realistic. It is the author's contention that not only is it realistic but is tactically and doctrinally sound and has historic precedent. First, as was mentioned above, one of the fundamental principles of war is the principle of mass. AFM 1-1 states, "Aerospace forces possess the ability to concentrate enormous decisive striking power upon selected targets when and where it is needed most."[30] This applies to all air forces, not just the Air Force. A well-known large force mission-packaging concept in the tactical air force is what is commonly called the "gorilla."[31] This involves a large number of various types of aircraft attacking a single target. Each type of aircraft is selected for its particular capability, such as F-16s for bomb deliveries, F-15s for air superiority, and F-4Gs for SEAD. With the proper combination of the strengths of various components, we can form a much stronger and more effective whole. A joint force gorilla such as is proposed here is merely the logical extension of a proven concept.

Aside from being tactically sound, the concept of a joint force gorilla has historical precedent. As was discussed in chapter 1, USAF bombers were protected by Marine night fighters to make up for a lack of required capability, while Air Force CAS and interdiction missions were augmented by Marine and Navy assets to provide the necessary numbers of aircraft (or mass) for mission effectiveness.

More recently, USAF F-111s were used in Operation El Dorado Canyon because the Navy did not have enough A-6Es in place to accomplish the mission objectives independently. Navy aircraft

provided the necessary air-to-air protection (F-14s) and SEAD assets (F/A-18s, A-7s) for both the Air Force and Navy attacks. Joint force employment was a required and logical decision. The inclusion of Air Force aircraft as a joint package had the added benefit of enhancing tactical surprise. While Libyan defenses concentrated mainly on the known, in-place carriers to the east, the unexpected F-111s out of the northwest provided a second and totally unexpected axis of attack for the overall mission.

Finally, the idea of a joint force package is doctrinally sound. Again, AFM 1-1 says, "Unity of Command is imperative to employing all aerospace forces effectively. . . . Aerospace forces are employed as an entity through the leadership of an air commander."[32] Since all air assets, regardless of service, should be under a single commander, force packaging should be based mainly on required capability for mission accomplishment, not on whether the airplane has "USN" or "USAF" on the side.

Summary

By no means is this example meant to illustrate all of the problems and solutions of joint Air Force–Navy night operations. Neither is it meant to conclusively prove to the reader that joint night operations are tactically desirable in all cases. There will be times when the challenges outweigh the benefits and joint night operations should not be attempted. However, as this example hopefully demonstrated to the reader, there is at least a possibility of increased tactical capability through joint operations if the challenges can be met. How to meet and overcome these challenges, and even what some of the challenges are, should be identified in peacetime training. Writing off joint night operations as too hard to do without first trying is just as bad as hoping that wartime experiences will provide solutions to wartime problems that were not identified in peacetime training. Accordingly, chapter 3 addresses the current status of joint night training.

Notes

1. AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, 16 March 1984, 2-7.

2. Ibid., 2-11.

3. Ibid., 3-3.

4. Ibid.

5. Ibid.

6. Ibid.

7. Multicommand Manual (MCM) 3-1, *Tactical Employment*, vol. 6, *F-111 Tactics*, 14 October 1988, 2-3.

8. Lt Col John Rivers, Air War College, Maxwell AFB, Ala., interview with author, September 1990.

9. Lt Col Mel Copeland, Air War College, Maxwell AFB, Ala., interview with author, September 1990.

10. Capt Steve Tate, F-15 pilot, 1st Tactical Fighter Wing, television interview from Saudi Arabia, CNN, 17 January 1991.

11. Capt Jane Patterson, instructor/senior director, and Maj Dick Embry, pilot, 964th AWACS, Red Flag 91-2, Nellis AFB, Nev., interview with author, 13 February 1991.

12. Edith M. Lederer and David Evans, "The Air Campaign: A Look at How It All Began," *Air Force Times* 51, no. 29 (25 February 1991): 18.

13. AFM 1-1, 3-3.

14. Ibid., 3-4.

15. Col Paul J. Kern, commander, 2d Brigade, XVIII Airborne Corps, "Soldiers 'Oriented on the enemy'," *Air Force Times*, 17 September 1990, 68.

16. "U.S. Tactical Forces Close to Adding Three New Night-Fighting Aircraft," *Aviation Week & Space Technology*, 12 November 1990, 63.

17. Julie Bird, "'Warthogs' Do Their Hunting after Sunset," *Air Force Times* 51, no. 28 (18 February 1991): 8.

18. Patterson interview.

19. Both of these examples are drawn from the author's personal experiences as an Air Force–Navy exchange officer serving as an F-14 instructor radar intercept officer from September 1983 through March 1986.

20. Lederer and Evans, 18.

21. "Three New Night-Fighting Aircraft," 63.

22. "Weinberger, Crowe Provide Additional Details on Libya Raid," *Aerospace Daily*, 26 June 1986, 495.

23. 4440th Tactical Fighter Training Group, *Final Report, Red Flag 88-1*, 24 October 1987–21 November 1987 (Nellis AFB, Nev.: The EC Corporation, 1987), 6.

24. MCM 3-1, vol. 1, *General Planning and Employment Considerations*, 4 July 1989, A7-4.

25. Maj Roger L. Smith, *A Two-Edged Sword: Preparing USAFE for the Low-Intensity Arena* (FOUO/No Contract/NOFORN) (Maxwell AFB, Ala.: Air University Press, April 1990), 28, 42. (Information extracted is not FOUO.)

26. Capt Robert H. Brown, "A Real Hog War: The A-10 in Low-Intensity Conflict," *Airpower Journal* 4, no. 4 (Winter 1990): 65.

27. "Allied Fire May Have Killed Marines," *Montgomery Advertiser*, 2 February 1991, 4A; and "Gulf," *Montgomery Advertiser*, 4 February 1991, 10A.

28. John King, "Friendly Fire Kills Two," *Montgomery Advertiser*, 18 February 1991, 1A.

29. Brown, 64.

30. AFM 1-1, 2-7.

31. Robert K. George and Lonnie C. Goodson, "Planning, Leading and Executing a Large Force Package: The Gorilla Lives," *USAF Fighter Weapons Review*, Summer 1985, 5–8.

32. AFM 1-1, 2-8.

PHOTO SECTION

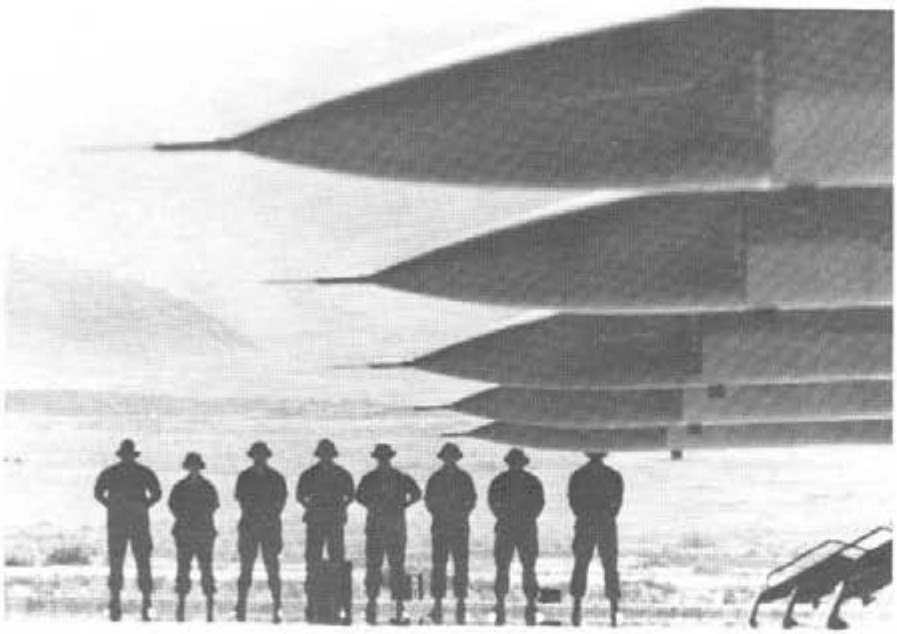
Pilot's helmet with night vision goggles.

The USAF Tactical Fighter Weapons Center at Nellis AFB, Nevada, is responsible for all Red Flag activities. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

A pilot from a Red Flag Aggressor squadron checks his equipment. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

An F-16 lifts off from a Nellis runway. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

A silhouetted A-10 awaits the beginning of night operations. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)



Crew chiefs prepare to launch their F-16s during a Red Flag exercise. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

An A-10 pulls up after bombing a tank target on the Nellis range. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

A busy ramp during a Red Flag exercise. (Photo courtesy of TFWC/HO, Nellis AFB, Nevada.)

Chapter 3

Current Training Programs

Chapter 2 described a scenario for possible employment of joint air assets in night warfare. As the reader can see, such operations could be extremely complex and require a great deal of planning and skill to be successful. The appropriate skills and experience can only be achieved through regular training under the most realistic conditions possible. This chapter examines some of the current training programs and exercises involving joint night operations.

The intended focus of this chapter is on large-scale (above wing level) training or exercises involving two or more services. Air Force training programs at wing level and below have already been the subject of at least two studies. In his ARI research report, *LANTIRN Operational Training for the F-15E and F-16C/D*, Lt Col David G. Blair proposed a detailed training plan for aircrews to achieve individual proficiency in night operations.[1] In a 1988 research report for Air Command and Staff College, Andrew M. Gecelosky recommended a comprehensive wing training schedule to ensure that all assigned squadrons could achieve and maintain unit proficiency in night operations.[2] Although the emphasis in both of these reports was specifically on LANTIRN training, the recommended number and types of training programs are applicable to other kinds of night training.

Neither of the above studies considered the requirement for *joint* night training. This chapter discusses why such a training program is needed today and where the opportunities for such training exist. Specifically, this chapter addresses what joint night training is now being carried out in the following exercises and locations: Red Flag, Nellis AFB, Nevada; Naval Strike Warfare Center, Naval Air Station (NAS), Fallon, Nevada; National Training Center (NTC), Fort Irwin,

California; the Marine Corps Air-Ground Combat Center, Twentynine Palms, California; Cope Thunder, Clark AB, Philippines (as of this writing); and Team Spirit, Republic of Korea.

Requirements for Realistic Training

Successful military operations require more than equipment; they also require people who are skilled at using that equipment. The key to proper employment is realistic training. When proper and realistic training has been absent, employment has suffered. This was just as true in World War II as it was in Operation Desert Storm. A few brief examples will serve to emphasize this point.

One early example of how the lack of training has had an impact on employment is found in the first B-29 night bombing raid against Japan on 10 March 1945. Night bombing was a new tactic in which the B-29 crews had no experience. A significant concern for Gen Curtis E. LeMay, the commander of the XXI Bomber Command, was the possibility of fratricide. Since the B-29 crews were untrained in night operations, General LeMay feared that the gunners might get confused and shoot down some of their own B-29s in the dark. To prevent this, LeMay ordered all of the guns and gunners removed from the attacking B-29s.[3] This was a somewhat radical solution that was forced on LeMay because of a lack of time to conduct night training before the attack.

A more recent example that pointed out a lack of joint force training occurred during Operation Urgent Fury, the invasion of Grenada in October 1983. Because the entire operation was planned and executed in less than four days, there was no time for specific training and practice. This was further complicated by the fact that the planning and execution staffs for Operation Urgent Fury had also been hastily assembled and had not worked together before. The staff lacked certain critical skills for joint operations, such as how to plan and coordinate joint air and naval fire support for ground forces.[4] A continuing joint staff training program in peacetime could have identified and eliminated some of these problem areas before the operation was even conceived.

A lack of joint training also affected operations in Operation Desert Storm. During a newspaper interview on 29 January 1991, Col Charles Burke, aviation officer of the US Army 3d Armored Division, stated that the first of his unit's tank-killing Apache helicopters had just arrived near the front lines a few days earlier. Although the air phase of Desert Storm had started nearly two weeks before and the ground phase could be expected to commence at any time, Colonel Burke said that his pilots wanted "more time to practice night flying and to participate in joint training with A-10 jets before going into ground war."[5] Colonel Burke and his pilots were fortunate that they had the time to conduct what should have been peacetime training during an ongoing war.

Not all examples have had such fortunate outcomes, though. During joint night operations in the recapture of Khafji, Saudi Arabia, an Air Force A-10 pilot mistook a US Marine light armored vehicle (LAV) for an Iraqi vehicle and attacked it with a Maverick missile. As explained by Maj Pat Hoy, an experienced A-10 pilot assigned to the 422d Operational Test and Evaluation Squadron at Nellis AFB, A-10 threat-recognition training emphasizes US Army and some other allied equipment but does not include US Marine equipment. The friendly equipment that is included has one feature in common—they all have treads, not wheels. The BTR-60, a Soviet-built armored personnel carrier used by Iraq, however, has wheels. In the midst of a battle, particularly when seen at night through an infrared sensor, the presence of treads would mean that it could be friendly, but a vehicle with wheels was presumed to be enemy.[6] Unfortunately, the LAV uses wheels, not treads. Since Air Force A-10 pilots do not regularly train with Marines, this was an unrecognized ambiguity. Although the official findings have not yet been published, it is at least possible that a lack of joint night training between Air Force and Marine forces was a contributing factor in this incident.

The necessity for joint training is recognized throughout the armed services. Air Force basic doctrine states that "to accomplish national military objectives, our military forces train to fight as an interdependent team of land, naval, and aerospace forces."[7] In Army Field Manual 100-5, *Operations*, this is expressed as "commanders must understand

the techniques of integrating Air Force, Naval, and Army firepower effectively in the conduct of campaigns and major operations."[8] But how are those necessary skills practiced and trained for? The remainder of this chapter discusses some of those joint training exercises that we have today.

Red Flag

The first major training program to be discussed is Red Flag, conducted by the 4440th Tactical Fighter Training Group (TFTG) at the USAF Tactical Fighter Weapons Center, Nellis AFB. As described in COMTAC EXPLAN 80, Red Flag is a six-week exercise divided into 3 two-week periods. Each period has nine and one-half days of flying (Monday through Friday) against progressively more challenging targets and threats. The flying day has two launch periods, an "AM Go" and a "PM Go." To ensure participation by the maximum number of aircrews in a limited time, individuals are restricted to one mission per day. Participating squadrons rotate out at the end of the second and fourth weeks to allow other squadrons to participate in the same exercise schedule.[9] The Tactical Air Command conducts five Red Flag exercises each year, plus one Green Flag (Red Flag with enhanced electronic warfare training) and one Maple Flag (conducted at Cold Lake, Alberta, Canada). Given the similar nature of the three different types of exercises, and for purposes of simplicity, we will use Red Flag as a generic term for all three.

The purpose of Red Flag is to expose aircrews to the most realistic combat conditions possible in a peacetime environment. In these exercises, the emphasis is on large-force composite training with joint US forces and composite forces from allied nations. This affords the aircrew the opportunity to practice with other types of aircraft and against a more challenging threat than would be available at their home station. Conducted in the mountains and desert north of Las Vegas, Nevada, a typical Red Flag mission package includes ingress through enemy fighters and SAMs, low-level navigation to and attack on a

tactical target (truck park, airfield, railroad station, etc.) defended by SAMs and AAA, and egress back through the enemy defenses. Through remote sensors, aircraft-mounted transmitters, and computer graphics, a mission in progress can be monitored on large-screen video at the Red Flag operations building and then can be recorded for a complete mission review and debriefing. This debriefing includes the effects of enemy air and surface defenses, simulated air-to-air missile shots, and bomb scores from both practice and live ordnance drops. Red Flag missions can be conducted either during the day or at night.

The current purpose and intent of Red Flag is to serve as the culmination point of a unit's training program, not as the test bed for new tactics. To gain the maximum benefit from the short exposure time available, aircrews are encouraged to use those tactics that they have first practiced and developed at home station, not attempt to develop new tactics in a new environment.[10] If the aircrews want to try a new employment tactic, such as a new formation or a new attack pattern, they must first practice it at home station before attempting it at Red Flag. This is a valid and valuable building-block approach to training that changes one variable (the combat environment) while keeping all other factors constant (the tactics). Attempting to change too many variables at once can overload the aircrew and prevent the identification of which factor (tactic or environment) may be responsible for ineffective employment.

Since Red Flag exposes the participants to more than one type of aircraft, the participants learn what skills and capabilities can be provided by other types of aircraft and crews.[11] This exposure does not require participation in or development of new tactics but simply provides information of what another asset can do using its own already developed equipment and techniques. For instance, the third period of Red Flag 91-2 included USAF F-15Es, F-111s, and F-16s plus Navy A-6Es and EA-6Bs. None of the Air Force aircraft were equipped for SEAD missions using the high-speed antiradiation missile (HARM), but the Navy A-6Es were. During the first few days of the exercise, the Air Force crews were not aware of this Navy capability, and the Navy crews were not aware of the Air Force's lack of capability. Through

exposure to each other in the mission-planning and debriefing processes, the participants became aware of this overlooked capability and started including Navy A-6Es for SEAD missions in support of Air Force bombing missions.[12] Simultaneously, the Air Force F-15Es and F-16s, with their greater air-to-air capability, could provide increased protection for the A-6Es en route to the target. This did not involve any new tactics, just a simple act of scheduling the appropriate times and targets for the aircrews to use their own developed skills on a coordinated attack. The net result was better package protection and greater mission effectiveness for both services. This is a simple but very illustrative example of exactly the type of joint training benefits that Red Flag provides.

Although the joint experiences and training benefits of Red Flag have been excellent, night training, particularly joint night training, has been very limited. As was discussed in chapter 1, this has been driven by a lack of aircraft technology to do the night mission. Because the Air Force did not have a broad-based technical capability to do tactical night operations, there was little incentive to train in this mission, either as a single service or in joint operations. Between Red Flag 82-2 and Red Flag 90-2, there was no night flying during Red Flag exercises. Night missions in Red Flag 82-2 were limited to ground attack missions with F-111Ds and intercepts with F-4Ds and F-15s. The F-111 missions were single-ship operations using terrain-following radar and providing positive separation by flying geographically different ingress and egress routes.[13] Night intercepts were conducted under positive radar control with BVR missile shots. In their after-action report, the F-15 squadrons stated that night intercepts at Red Flag were so similar to training at their home station that they produced limited or no effective training benefit. The training to be gained by flying Red Flag intercepts at night did not outweigh the disadvantages caused by having to sacrifice a day sortie to fly a night sortie.[14]

Red Flag 90-2 conducted night operations during the middle two-week period of the exercise. Again, participation was limited to Air Force only, but a greater number and type of aircraft were involved. LANTIRN-equipped F-15Es and F-16s plus F-111s and F-117s were

scheduled for night interdiction, while A-10s flew CAS missions. Simulated enemy defenses included the normal range of Red Flag AAA and SAM threats plus F-15s in a DCA role. Target deconfliction procedures in 90-2 required a minimum of five-minutes' spacing between TOT for interdiction missions. The CAS missions were controlled by OA-10s and required air-dropped flares for target illumination and attack. As was discussed in chapters 1 and 2, combat experience has shown that "bomber streams" and flare illumination are not the most desirable tactics in a high-threat environment such as Red Flag is supposed to simulate. However, tactical training desires must frequently yield to peacetime safety requirements. Although experience in Operation Desert Storm subsequently proved that A-10s could operate at night without flare illumination, there was no overriding necessity to practice for that in peacetime when Red Flag 90-2 was conducted.

Red Flag 91-2, the most recent Red Flag at the time this book is being written, was the most aggressive night exercise to date. Night operations were scheduled in all three periods and included F-15Es, F-16s with LANTIRN, FB-111s, F-15Cs, and US Navy A-6Es and EA-6Bs. Although considerably reduced in size due to Operation Desert Storm, Red Flag 91-2 did include joint night operations with the Navy. Although the final report has not yet been published, this author had the privilege of attending the final week of period three as an observer. Comparing my personal observations to the previous after-action reports, Red Flag 91-2 appeared to be tactically similar to Red Flag 90-2 in that the participants used the skills and tactics that they were familiar with from unit training. They then coordinated their targets and timing to achieve a more effective overall mission package, such as the use of A-6Es with HARMs in a SEAD role for the Air Force bombers. Timing intervals between bombers were shorter than at Red Flag 90-2 but still resulted in a "bomber-stream" type attack. There were no night CAS missions in Red Flag 91-2.

The reader may conclude from the above after-action reports of limited night activity during previous Red Flag exercises that the Air Force does not have a very serious commitment to night air warfare.

This is the wrong conclusion. Night training at Red Flag today is at a proper level and pace given the equipment *and* aircrew experience available for night operations. The reader should remember that before the operational fielding of the LANTIRN system in 1989, the tactical air forces (TAF) were equipment-limited as to what they could do at night. As the LANTIRN system and similar night equipment are fielded, individual units and the TAF as a whole must undergo a building-block period to gain experience in night operations. As each squadron gains night experience, squadron night operations can become more aggressive in nature. As this experience base expands throughout the TAF, large-scale exercises with numerous participants, such as Red Flag, can be made progressively more challenging. Note that operations during Red Flag 91-2 were considerably larger in scope and difficulty than the ones in 90-2 had been. At this time, given the relatively narrow experience base with night tactical operations, the Air Force is correctly proceeding on a deliberate and cautious path to safely build greater capability throughout the TAF. Chapter 4 explores in more detail alternative paths that may be followed to build this experience.

The 4440th TFTG commander, Col James D. Woodall, and his Red Flag staff have proposed a phased increase to Red Flag to develop a training program that is more challenging and realistic from a tactical standpoint. One of the impediments to more realistic combat training that Colonel Woodall and his staff have identified is a lack of realism in force packaging for Red Flag exercises. Squadrons are scheduled to attend Red Flag based on their availability when compared to all other unit commitments, such as overseas deployments and Joint Chiefs of Staff (JCS)-directed exercises. They are not scheduled based on the organizational structure in which they would expect to go to war.[15] For instance, a particular wing of F-16s may be based in the CONUS but assigned to the Pacific Air Forces (PACAF) in time of war. Under the appropriate war plans, this wing of F-16s would expect to operate with PACAF-based F-16s plus CONUS-based F-15s and US Navy aircraft assigned to the Pacific Fleet. However, because of scheduling commitments between the various units involved, the CONUS-based F-16s may be participating in Red Flag with F-15s committed to Europe

and Navy aircraft assigned to the Atlantic Fleet. As a result, the Red Flag participants may not have the opportunity for realistic training with the units that they would go into combat with. As was discussed earlier in this chapter, simple exposure to each other does have very valuable training benefits. These benefits could be even greater if aircrews participated with the units they expected to go to combat with, not with just any generic unit. Joe Montana didn't practice with just any wide receiver before the 1989 Super Bowl; he practiced with Jerry Rice.

The 4440th TFTG has some specific recommendations for more effective training at Red Flag. One of the key recommendations is to plan each Red Flag exercise around a particular combatant command, such as PACAF or US Air Forces, Central Command (CENTAF). Those squadrons assigned to the particular command, including overseas-based squadrons, would then be tasked to participate in that particular Red Flag. By also including those Navy, Marine, and Army units with tasking in the appropriate geographical area of responsibility, this would make Red Flag training more representative of expected combat employment.

The 4440th TFTG also has a proposed program of enhancements to Red Flag, called Red Flag 2000. A portion of this proposal would build on the present night air warfare experience base and schedule a dedicated night Red Flag exercise once a year. Current night Red Flags involve one daytime flying period per exercise day and one night flying period. In effect, a "night go" replaces the "AM Go." Under the dedicated "Night Flag" program, all units would have two "night go's," the first with a twilight takeoff and night landing, the second with a night takeoff and landing. This would be a more aggressive and hopefully more realistic night training program than the current one.[16]

Another key feature of the Red Flag 2000 proposal would expand Red Flag from the current six weeks to nine weeks. The first week of each three-week period would include a mission commanders' school to indoctrinate exercise mission package commanders in some of the difficulties of planning and coordinating a composite force "gorilla." It could be particularly valuable for joint familiarization with other than US Air Force equipment and would formalize the process of learning

each other's strengths and weaknesses before any flying is done. The Red Flag exercise itself would then be oriented around a tactical mission objective, not just unit training objectives.[17] If the Red Flag 2000 proposal is approved and adopted, there should then be fewer planning unknowns before the first mission is flown, which would increase the overall effectiveness of Red Flag.

There is, however, a deliberate limitation to the ability of Red Flag to be used to develop or validate new tactics, particularly new joint tactics. As was previously mentioned, Red Flag is viewed as the culmination of a unit's training program, not a test bed for new tactics. Any new tactics, particularly those involving joint assets, must be practiced and perfected at home station before they are allowed to be attempted in the more demanding Red Flag environment.[18] However, there is no existing program to encourage or authorize joint tactic development. Units scheduled to participate in a Red Flag exercise are provided a list of what other squadrons are scheduled for that same time period, but the squadrons are not required to contact each other for workup training before arrival at Red Flag. The first contact that they may have with each other could very well be during the mission-planning period before their first Red Flag flight.

Even if a particular squadron does wish to include training with other Red Flag participants as part of its workup schedule, there is an additional block to joint night training. Air Force operational fighter squadrons are not authorized to train with tactics that have not already been validated by the director of tactics and test operations of the 57th Fighter Weapons Wing (FWW) at Nellis AFB. This organization is specially tasked and manned with highly experienced fighter crews for the specific purpose of perfecting new techniques in a safe and controlled environment before employment by the general tactical air forces. At present, the 57th FWW has no joint night tactics development program under way, nor does it have direction or authorization to begin such a program.[19] Until such authorization is given, the 57th FWW cannot develop joint night tactics; therefore, Air Force squadrons cannot train in joint night tactics either at home station or at Red Flag.

Naval Strike Warfare Center

The US Navy equivalent to Red Flag is the Naval Strike Warfare Center (Strike) located at NAS Fallon, near Reno, Nevada. The facilities and training capability at Fallon are similar to those at Nellis and provide the capability for large-scale, day and night employment with composite forces. Missions at Fallon include air-to-air attacks against simulated enemy aircraft, air-to-surface attack missions, and electronic warfare training. However, Fallon's facilities are considerably smaller and less sophisticated than those at Nellis. For instance, a surface attack target for an OCA mission at Nellis could very well include a bulldozed runway, taxiway, and parking ramp; tires outlining the operations and maintenance facilities; and actual aircraft hulks for targets. The same target array on the Fallon ranges may be limited to a bulldozed runway airstrip with a collection of old tires or two-dimensional plywood targets to simulate parked aircraft. Despite this lack of sophistication, aircrews who have participated in both Red Flag and Strike regard the training at Fallon to be very comparable and effective.[20]

In addition to the differences in the level of sophisticated equipment, Strike has two differences in operational training as compared to Red Flag. First, at Fallon, the air-to-air war is not as fully integrated with the air-to-surface war. During Red Flag, air-to-air sorties are scheduled and integrated in support of the air-to-ground missions. At Strike, the air-to-air phase is separated from the air-to-ground war.[21] This allows the aircrews to concentrate more on developing their particular skills, but it lessens the learning experience that could be provided by a more fully integrated campaign scheme.

The second difference involves the method by which the units are scheduled to participate in Strike. As was discussed earlier, Red Flag scheduling is based on unit availability and does not necessarily reflect the expected combat organization. By contrast, an entire carrier air wing (CVW) is scheduled for training at Strike as part of their regular workup training before deployment. The CVW includes all of the aircraft that will be deployed on the carrier in their anticipated combat structure and strength. Through training at Strike, the CVW gets to train with those

exact squadrons and aircrews with which they expect to go into combat. As a result, there is a greater knowledge of each other's capabilities and a sense of team unity at the start of Strike than there is at Red Flag. Aircrews who have participated in both exercises reported that the team spirit that was developed over the first week of Red Flag was present on day one at Strike.[22]

Despite the similar nature of the two training facilities, there is no formal interchange or joint training program between the Naval Strike Warfare Center and Red Flag.[23] The two programs are aware of each other and have occasional informal exchanges of information, but there is not a formalized program for joint participation in each other's training programs. As was discussed above, Navy and Marine units regularly participate in Red Flag based on schedule availability, not on an anticipated wartime structure. However, there is no equivalent program for regularly scheduling Air Force units to participate in joint training at Strike. Since the Navy has never stated a requirement for continuing Air Force participation, there is no funding program for Air Force units to go TDY to NAS Fallon for formal joint training.[24] Any Air Force missions at Strike are on an informal, as available basis and usually involve flights out of nearby Air Force bases, such as F-111s out of Mountain Home AFB, Idaho.

National Training Center

The primary location for large-scale joint training between Army and Air Force units is the NTC, located in the Mojave Desert near Fort Irwin, California. Training at the NTC includes day and night operations for Army ground and air forces and day training for Air Force tactical aircraft, but it does not include Air Force night air activity.

Air Force participation at the NTC, known as Air Warrior I, is controlled by the 4443d Tactical Training Squadron (TTS) at Nellis AFB and the 4445th TTS at Fort Irwin. As described in COMTAC

EXPLAN 323, Air Warrior involves CAS and backup aircraft inventory in support of Army ground forces at all levels of combat.[25]

Army units deploy to Fort Irwin as two-battalion task forces for a two-week training period. While one battalion is conducting live-fire exercises against simulated targets, the second battalion is practicing against specially trained US Army adversary units in large-scale, force-on-force exercises. After the first week, the battalions swap roles.[26]

Air Force units tasked in CAS and BAI missions at the NTC participate in both phases of training. Techniques and procedures for integrating artillery fire and tactical air power are trained for during the live-fire phase with live-ordnance deliveries. Realistic problems of controlling and integrating tactical air power in a dynamic battle, including basic communications procedures and identification of friendly and enemy forces, are practiced with simulated attacks against live adversaries in the force-on-force phase. Air Force aircraft that are used in Air Warrior include A-7s, A-10s, F-4s, and F-16s. The intent of the program is to "exercise joint US Army–Air Force planning, coordination, and execution," and to "train the way we plan to fight." [27]

Despite these excellent goals, there is a significant gap in the training experience at the NTC. Army battalions participating at NTC train for around-the-clock combat. Each training rotation includes at least one night battle with all Army assets, including helicopters.[28] However, at this time Air Force aircraft do not fly night CAS or BAI missions at NTC.[29] Air Force nonparticipation at night has at least two negative impacts on overall joint mission effectiveness. First, ground forces do not train in night operations against a realistic night air threat. Air Force sorties as adversary air during the force-on-force phase could provide more realistic exposure to the difficulties of night movement against an air threat. Air Force missions as both friendly and adversary air with different types of aircraft could provide ground forces training in how to identify and defend against an enemy air attack at night.

A second negative effect is that aircrews do not get the most realistic training possible in joint CAS/BAI target location and identification at night. Tasking as either friendly or adversary air during the night

force-on-force phase would provide extremely realistic training in the problems of identifying friendly and enemy ground forces, coordinating night helicopter and fixed-wing action, and locating BAI targets on the move at night. As was discussed in chapter 1, the lack of technical capability for night interdiction against convoys seriously hampered the overall interdiction efforts in World War II, Korea, and Vietnam. Now that the Air Force has the technical means to do the mission, we still are not making the most effective use of the available training to achieve an overall mission capability.

As was graphically demonstrated by the A-10s in Operation Desert Storm, night CAS and BAI can be done if aircrews are properly trained for them. Although the A-10s were not specifically equipped for night operations, their pilots were able to use the IIR Maverick and limited natural illumination for highly effective night BAI missions against Scud missile launchers, supply convoys, and SAM sites. This mission effectiveness was not the product of any special night equipment but was the direct result of four months of night training in the Saudi Arabian desert before Operation Desert Storm started.[30] The NTC provides the opportunity for such training in peacetime in the event that we do not have four to five months to practice before the next war.

Twentynine Palms

The last large-scale training program located in the CONUS to discuss is the US Marine Corps Air-Ground Combat Center at Twentynine Palms, California. Although it is equipped with less sophisticated equipment than the NTC, Twentynine Palms provides the same type of training in all aspects and levels of ground warfare fully integrated with tactical aviation support. This includes full nighttime operations with both ground and air forces. However, the Marine training center is almost exclusively single service, not a joint training program. Since the Marine air/ground task force (MAGTF) includes its own Marine tactical aviation assets, there is less of a requirement for Air Force tactical

aviation support for Marine ground forces. Any Air Force participation at Twentynine Palms is more informal in nature, similar to Air Force flying at NAS Fallon.

The potential shortfall in this limited joint training should be obvious from the recent experiences in Operation Desert Storm. As was shown during the recapture of Khafji, Air Force air can expect to be used to augment Marine air in support of Marine ground troops. If the two services expect to operate together, they must have a program to train together.

Cope Thunder

The PACAF equivalent to Red Flag and the Naval Strike Warfare Center is Cope Thunder. Cope Thunder is a large composite force tactical air exercise based at Clark AB on the island of Luzon, Republic of the Philippines. Available training includes air-to-air and air-to-ground missions and an electronic warfare range. The range monitoring and debriefing facilities at Cope Thunder allow both day and night operations but are less sophisticated than those at Red Flag. For instance, Cope Thunder range equipment does not include the computer-aided video systems that Red Flag has to allow real-time mission overview and comprehensive mission playback.

Although lacking the technically more advanced equipment that is available at Red Flag, Cope Thunder does include one feature that Red Flag is developing. For several years now, the Cope Thunder staff has used the week before commencing a Cope Thunder operation for a mission commanders' school at Clark AB. This week-long class trains selected aircrews in some of the planning and coordination difficulties that they will experience as large-scale joint force mission commanders during the upcoming Cope Thunder. This is the same type of training that Red Flag planners are now attempting to add to their exercise.

The stated purpose of Cope Thunder is to provide realistic combat training to PACAF forces. By directive, joint forces may be included for enhanced training but "will not interfere with USAF participation."[31] On

the surface, this would seem to be a hindrance to the amount of joint training that could be scheduled, but in practice it has not been such. Historically, approximately 25 percent of all Cope Thunder sorties have been flown by either US Navy or US Marine Corps aircrews.[32]

In at least two ways, joint training at Cope Thunder is in a more realistic environment than at Red Flag or Strike. First, Navy aircrews train at Red Flag and Strike during the time period between carrier deployments, not while their carrier is under way. The aircraft and crews physically deploy to either Nellis or Fallon for the duration of the exercise. In contrast, US Navy aircrews flying in Cope Thunder regularly launch and recover from their assigned aircraft carrier operating off the coast of Luzon. The participants miss the face-to-face mission planning and debriefing opportunities that they would have if the Navy crews and aircraft were based at Clark for Cope Thunder. However, by being physically separated and forced to rely on the same communications networks that would be used in combat operations, all participants do learn some of the real-world difficulties that would be encountered when conducting joint operations with both land- and sea-based air assets.

Cope Thunder also provides additional realism for training by default, if not by design. Squadrons participating in Cope Thunder are those Air Force and allied units that are stationed in the Pacific and those Navy and Marine units that are deployed to the area. Cope Thunder thus allows joint training with many of those units that would go to combat together in the event of a war in the PACOM region. The training is not completely realistic, though, since it does not include regular participation by those CONUS-based units that would be deployed to PACOM during time of war. Given the long distances and the associated costs that would be involved in such a deployment, frequent Cope Thunder training by CONUS-based units is probably not operationally or financially feasible. Using the same argument, it is probably also not feasible for PACAF-based squadrons to train with their CONUS-based augmentation squadrons by deploying to Red Flag on a regular basis.

Although joint training at Cope Thunder may be somewhat more realistic than at Red Flag, night training—either joint or Air Force

exclusive—is less advanced. The last Cope Thunder to include night flying was Cope Thunder 86-4 in March 1986. Night operations in Cope Thunder 86-4 were limited to night CAS with aerial flares used for target illumination. After-action reports for Cope Thunder 86-4 were highly critical of this training.[33] The opinion of the participating squadrons was that the limited benefits of this night CAS training, which could be done at home station, did not outweigh the disadvantages of having to give up day Cope Thunder sorties to meet the night schedule.[34] (Interestingly, this is the same type of complaint that was voiced by the F-15 pilots flying night intercept missions in Red Flag 82-2.)

Given the limited Air Force night capability available at that time, this was probably a realistic assessment of night training at Cope Thunder in 1986. However, with the recent introduction of the LANTIRN system into the Pacific theater, Cope Thunder is being expanded to include night flying on a regular basis. Cope Thunder 92-6, scheduled for April 1992, will include night operations with Air Force squadrons and with the Navy squadrons embarked aboard the USS *Midway*.[35] The scope and extent of future night Cope Thunders will draw on this experience base.

Team Spirit

Although it is not a training program in the same sense as those that were previously described, Team Spirit is a very valuable training experience for PACOM aircrews. Team Spirit is a yearly joint and combined air, land, and sea exercise on the Korean Peninsula. It is not a controlled-range training program like Red Flag or Cope Thunder but a full-scale exercise of US and Korean combat capability. Ground and air operations are around-the-clock. Air operations include live ordnance deliveries on controlled bombing ranges and simulated deliveries over a designated ground maneuver area in support of Army and Marine ground troops.[36]

Because of the less structured training environment of Team Spirit in comparison to Cope Thunder or Red Flag, there is less capability for a

comprehensive debriefing and for lessons learned. For those readers who appreciate sports analogies, this might be compared to the difference between a football team practice with full gear and an exhibition game. In the team practice (Red Flag or Cope Thunder), there is a great deal of control and an ability to structure both offense and defense to stress execution of specific plays. In the exhibition game (Team Spirit), there is less control over the opposition but a greater degree of realism. Both are valuable training experiences, but with different focuses. Just as the exhibition game allows a coach to evaluate how well his total team performs in an uncontrolled but realistic environment, Team Spirit offers a more comprehensive training experience in conditions that more closely approximate the "fog and friction of war." Just like the football team, though, the coach doesn't try the full-scale exhibition game (Team Spirit) until he has instilled fundamentals at team practice (Cope Thunder and Red Flag).

The mission structure at Team Spirit emphasizes large, joint-force employment in a realistic scenario. Unlike Red Flag and Cope Thunder, where mission objectives are at least partially determined by individual squadron training desires, Team Spirit missions are directed from the top down in keeping with the exercise combat scenario. Flying tasking is based around five large-force mission packages per day using joint and combined assets in an integrated effort. These large-force packages are not carried over into the night missions, which are single-service oriented.[37]

Night flying is included in all types of missions during Team Spirit, with one notable exception. Navy and Marine aircrews flying in Team Spirit fly all types of tactical missions during both day and night. At present, Air Force crews fly interdiction, air superiority, and SEAD missions at night but specifically do not fly night CAS missions.[38] This is a direct result of the previous lack of technical capability in Air Force aircraft for night CAS missions. With the increased night capability afforded by introduction of LANTIRN into the PACAF inventory, future Team Spirit exercises can and should include Air Force CAS missions at night by the appropriately equipped and trained units.

Summary

This chapter has discussed the major programs that offer the opportunity for joint night training today. In general, it appears that there exists unused opportunity for more aggressive and realistic training in joint service, around-the-clock warfare. Red Flag, the NTC, and Cope Thunder all have excellent programs in place for training aircrews in joint missions in the daytime but do not yet extend this same level of training into the night arena. The Naval Strike Warfare Center, Twentynine Palms, Team Spirit, and the Army portion of the NTC have comprehensive single-service training programs for day and night warfare, but have not fully integrated joint forces into their training programs. The Naval Strike Warfare Center and Twentynine Palms in particular are examples of missed training opportunities since there is no formal program for regular and frequent Air Force unit participation.

The current amount of joint night training is understandable and appropriate given the very recent introduction of night-capable technology. We now must increase the intensity of training to match the level of technology and thus increase the overall employment capability. We need to take advantage of all training opportunities to ensure that the previous limited capability for joint night operations due to equipment limitations is not replaced by an equally limited capability due to training limitations. To that end, chapter 4 discusses some recommendations for more comprehensive joint night training that build on the experiences and capabilities of the present programs.

Notes

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Chapter 4

Conclusions and Recommendations

As has been discussed in the previous chapters, before mid-1989 the Air Force's ability to conduct tactical missions at night was limited by technology. Any radar-equipped aircraft has the technical means to drop bombs at night against large targets. Before the introduction of LANTIRN, very few Air Force tactical aircraft were equipped with both an accurate target-ID system and a terrain-following system for very low-altitude flights in a high-threat environment. This technical capability was confined to approximately 250 F-111s, of which less than 75 had an enhanced night capability with Pave Tack infrared targeting pods, and slightly more than 50 F-117 stealth fighters.

With this quantitatively limited capability, employment practice was kept to the simplest level possible. As previously discussed, missions were planned for single aircraft bombing attacks with multiple attacks separated by time or space. Training supported this employment concept by developing aircrew proficiency in single-ship, single-service, night attack. Because there is no employment concept for multiship night attack or for joint-service night attack, no training is conducted in these tactics.

The much larger breadth of night capability that exists today provides the opportunity for more aggressive employment practices. When LANTIRN is fully fielded by June 1994, the tactical air forces will have nearly 200 F-15Es and 350 F-16s optimized for night operations to augment the remaining 100 F-111s and 55 F-117s.[1] These are just the night systems that exist today. Given the success of Operation Desert Storm, we should expect that any future tactical aircraft will include night operations in their design criteria. This will provide an even broader base of night capability throughout the tactical air forces.

At the same time that this increased tactical quality is reaching the Air Force, the total military force structure is decreasing quantitatively. The previous Air Force goal of 40 fighter wings is being reduced to 26 wings. The Navy plan for 16 aircraft carriers is being scaled down to 13 or possibly 12. Even more so than was the case in Operation Desert Storm, future military operations must plan on being joint efforts. Future training programs must be tailored to develop the most capable force possible in all areas, including joint night operations.

A possible alternative to a broad base of experience through joint training is the extensive use of interservice liaison officers on the various joint planning staffs. This approach has two drawbacks. First, unless the program is carried down to at least the wing level, such liaison officers become a limited resource that may not be available in the right place at the right time. Second, unless each liaison officer is fully trained in large-scale operations, one liaison officer may not have all the necessary information. This problem surfaced in the planning for Operation El Dorado Canyon. The Air Force sent seven officers to the joint task force planning sessions to cover all the various Air Force elements of the air raid on Libya. Each officer was an expert in his particular area but lacked in-depth knowledge of the other areas of the operation. The Navy sent just one officer who, through training and operational experience, was familiar with all elements of the Navy portion of the operation.[2] A broad base of experience in joint operations through training can make each and every pilot, in effect, a knowledgeable liaison officer. This will provide greater flexibility for future combat employment.

As was amply demonstrated in Operation Desert Storm, night air warfare and joint operations are arenas in which the United States now has an overwhelming advantage that should be exploited. Since victory on the battlefield frequently goes to the side that makes the best use of the existing military technology, the question is how to best use the technical advantages we now possess.[3]

One method is to fit the new technology into existing doctrine and tactics. This method can, however, fail to realize the best use of a new technology for maximum combat effectiveness. For example, following World War I, the existing US Army doctrine and tactics held to the view

that the tank was to be used in support of the infantry. In keeping with this tactic, the tank's maximum speed of advance was limited to the speed of the foot soldier. The German army recognized that the new technology provided by the armored tank could better be used as a high-speed assault weapon supported by truck-transported soldiers.

The alternative to forcing technology into existing doctrine and tactics is to evolve new doctrine and tactics to match the new capabilities. It is this second method of matching new doctrine to new technology which this book advocates. This chapter discusses nine recommendations for a phased or building-block approach to developing a more comprehensive joint night air warfare capability. The recommendations, which are discussed in more detail later, are as follows:

1. Implement Red Flag 2000 proposal.
2. Initiate annual night Cope Thunder.
3. Develop more extensive joint force tactics.
4. Expand formal joint training programs.
5. Begin mission commanders' school at Red Flag.
6. Initiate annual unified command Red Flag.
7. Expand joint night training at each center.
8. Increase joint night operations at Team Spirit.
9. Develop an annual unified command exercise.

The intent of the building-block approach is to initially broaden and increase Air Force night experience while simultaneously increasing joint warfare capability in the daytime. Once these two experience bases have been developed they would then be combined into a joint night program.

Expanding Air Force Night Capability

As the Air Force increases the quantity of its night-capable equipment, the first night training priority should be given to developing individual service expertise. As was discussed in chapter 3, the TAFs

already have a well-developed training plan to build and sustain individual aircrew proficiency at night. There are also training plans in place to ensure that a squadron maintains the desired number of aircrews qualified in the night mission. This section discusses a plan to build a broad base of experience in night warfare for the TAFs as a whole.

Recommendation 1: Implement Red Flag 2000 Proposal

As the first step to this plan, the author recommends that the commander of TAC approve the implementation of the Red Flag 2000 proposal for a dedicated Night Flag at least once per calendar year. The emphasis should be on Air Force participants, although joint-service participation should not be excluded. However, in the initial stages, as Air Force night expertise is expanded, any joint night mission should remain limited to integrating sister-service aircraft into the timing of the mission package but not yet attempting to develop joint formations or tactics.

To ensure the maximum training benefit of a dedicated Night Flag, all units tasked with a night mission should be scheduled to participate. This exercise should not necessarily be limited to night-optimized aircraft such as the F-111s, F-117s, F-15Es, and LANTIRN F-16s but should include all squadrons that have night operations in their unit mission descriptions. To make this plan work, Headquarters TAC/DO may need to make the annual Night Flag a top-priority exercise for the desired units. Under the present scheduling method, there is no guarantee that all the desired squadrons will be available at the same time.

During these Air Force Night Flags, the tasked missions should not include a single type of aircraft exclusively (all F-16, all F-111, etc.) but should be aimed at developing a mixed-force capability with other Air Force assets. For instance, this would be the appropriate time and place to train in night delivery tactics with F-15Es using buddy lasing to support F-16s dropping LGBs. Again, the emphasis at first must be on developing a highly skilled, broad-based, night-capable Air Force

before attempting the even more challenging aspects of joint night employment.

One particularly important mission area that should be included in the Night Flags is night CAS. In keeping with the recent experiences of Operation Desert Storm, CAS at Night Flag should be done without external illumination, either aerial or ground flares.

Ultimately, night CAS should include simulated attacks against live targets during force-on-force training at the NTC. This would not be incorporated until moving into the joint night training that is covered in recommendation 7. Under the building-block approach, the initial night CAS training should be against a ground array of stationary targets on the Nellis range. The goal should be identification and attack of a specific target, not just any of a cluster of targets. One possible method of practicing this would be to mount a remotely controlled ground laser locator designator on the same television ordnance scoring system (TOSS) camera that is used by the Red Flag range group to record and score bomb deliveries. The GLLD could be used to positively identify the specific target for aircraft equipped with Pave Penny pods simulating a FAC. Being mounted on the TOSS camera, this system can give immediate feedback on the success of the bomb run. By using the TOSS controls, the GLLD spot can then be shifted to a second or third target as the first one is "destroyed," allowing even greater realism. This is the most ambitious training method for target ID in night CAS. Simpler methods might include a remotely controlled or time-activated electronic heating circuit to highlight the appropriate target.

The current level of night training in OCA, air interdiction, and DCA appears to be appropriate, but it can be improved to provide a greater training opportunity for mixed-force employment. For instance, F-111s can train at home station in single-ship LGB attacks against a target. Night Flag should allow them to train in such tactics as planning and coordinating a buddy-lasing attack for LGB-equipped F-16s. The policy that you perfect it at home before trying it at Red Flag might require some workup training between the units before deployment to Nellis AFB. A reasonable substitution might be for each unit to perfect the basic technique at home using like aircraft, then simply employ that

practiced tactic at Night Flag using dissimilar aircraft. Night Flag should concentrate on bringing the different elements together into a more effective whole and on flying training missions that are qualitatively different from those which they can do at home station. The goal of Red Flag should be to train with tactics that you would expect to employ in combat but which you cannot regularly practice at home due either to equipment limitations or range space.

Recommendation 2: Initiate Annual Night Cope Thunder

At the same time that the Night Flag program is being adopted at Nellis, the Headquarters PACAF/DO should incorporate a similar annual Night Thunder exercise as part of the Cope Thunder program. Again, the emphasis should be on Air Force expertise, but joint and combined services should be integrated into the mission packages as much as possible. As was mentioned in chapter 3, the facilities at Cope Thunder are not nearly as sophisticated as are those at Red Flag. If financially and operationally feasible, night units in PACAF should be included in the Night Flag operations at Nellis. If this is not feasible, night training at Cope Thunder can still be highly effective with the equipment available. Such ideas as remotely controlled GLLDs for night CAS training may not be possible at Cope Thunder. Electrically heated targets powered by portable generators or even empty oil drums heated with charcoal may provide adequate substitutes. Again, the point should be to train with other Air Force assets in a different way than is possible at home.

Expanding Joint Capability

At the same time that the Air Force is perfecting its night expertise, we should begin to increase our overall joint capability and interoperability. As part of a phased or building-block approach to training, joint training should be done in the daytime first before

attempting the relatively more complex problems of joint night employment.

Recommendation 3: Develop More Extensive Joint Force Tactics

The first step to enhanced joint capability must be development of the appropriate joint procedures and employment tactics. This will require Air Staff direction to the 57th Fighter Weapons Wing director of tactics and test operations (57th FWW/DTT) at Nellis to initiate a tactics development program between the Air Force, Navy, Marine Corps, and Army. The actual development effort will be joint, but some service must take the initiative to get the program started. As the nation's primary aerospace service, the Air Force should be the lead service in this effort.

The hypothetical scenario in chapter 2 mentioned just a few of the areas in which joint force formations and tactics may provide an enhanced capability; there are probably others that the author has not considered. This recommendation is for a total joint development effort, including both day and night capability. In keeping with the overall building-block approach being considered, initial efforts should be directed to developing joint day capability. At the same time, the groundwork can be laid for subsequent development of joint night capability from the baseline day experiences.

Recommendation 4: Expand Formal Joint Training Programs

Again, as the premier air service, the Air Force, through the 4440th Tactical Fighter Training Group (TFTG), should initiate a formal and regular program of interaction between Red Flag, Naval Strike Warfare Center, NTC, and Marine Corps Air-Ground Combat Center. This interaction should include regular and continuing participation by Air Force units at the other training centers, as well as sister-service participation at Red Flag.

To the maximum extent that operational commitments allow, this joint service scheduling should reflect anticipated combat employment. For example, an Air Force squadron with a wartime commitment to PACAF should be scheduled to participate at Strike with a carrier air wing assigned to the Pacific Fleet, not with an Atlantic Fleet unit. Participation should be formally scheduled, not put on an "as available" basis. Participants should operate under the rules and policies of the host service for that center. Air Force crews participating at Strike would be expected to comply with Navy procedures, just as Navy crews at Red Flag must comply with Air Force procedures.

An increased and formalized program of interaction between the various centers will have two benefits. First, it will provide increased opportunities for joint training to more aircrews. The benefits gained by simple exposure to each other's capabilities, as discussed in chapter 3, will be available to more aircrews on a more regular basis. This will broaden the joint knowledge base of all the services. Second, more opportunities for joint exposure will more rapidly highlight challenges in joint operations and possibly identify the most efficient way of meeting the challenges. A procedure or equipment incompatibility that was identified as a minor irritant that could be worked around at Red Flag might be a major difficulty with no apparent solution at Strike. A formal program for joint interaction, including comparisons of lessons learned and actions taken, could smooth these challenges.

Recommendation 5: Begin Mission Commanders' School at Red Flag

A key part of successful large-force operations, either joint or single service, is that the overall commander must have a firm understanding of his total force capability. Of great benefit to this understanding would be a Mission Commanders' School at Red Flag, similar to the one currently conducted at Cope Thunder. As was discussed in chapter 3, the current proposal by the 4440th TFTG would increase Red Flag to a total of nine weeks instead of the current six. There would be 3 three-week periods with the first week of each period devoted to Mission

Commanders' School. To save time and TDY expenses, the author recommends that this proposal be changed to a total of seven weeks per Red Flag. This change would maintain the 3 two-week periods but add a seventh week at the beginning of the exercise. This first week would be devoted to Mission Commanders' School for the entire exercise.

As a preliminary step to enhance the overall training of Red Flag, participants should provide a background paper on their units. These background papers would include short descriptions of the performance capabilities and limitations of the assigned aircraft, typical ordnance loads, mission-planning factors such as employment speed and combat radius, and the primary and subsidiary missions the squadron trains for. They would be compiled into a facts book for all participants in that particular Red Flag.

Such a fact book would be a useful complement to the proposed Mission Commanders' School but should not be assumed to be an adequate substitute for more comprehensive training. Instructional books, while valuable reference works and essential parts of training, are not sufficient by themselves. For example, when participating in joint exercises with the Navy, E-3 AWACS aircraft carry reference books on Navy procedures, radio frequencies, and other information. Unless you are very experienced with the content and organization of these books, it is very difficult and time-consuming to find the particular information you need. Even with positive reinforcement through joint exercises, it can take as long as two weeks of training for Air Force AWACS crews to become comfortable with Navy procedures. Without frequent repetition, these skills can deteriorate and cannot be relearned simply by reading a book.[4]

The suggestion for such a fact book has been rejected during previous Red Flags on the grounds that "everybody knows that." This may be true for all Air Force Red Flags, but as was discussed in chapter 3, the empirical evidence in Red Flag 91-2 indicates that everybody does not know everything about joint assets. For the first few days of the third period of Red Flag 91-2, the Air Force aircrews were suffering losses in the exercise to enemy defenses because they did not know that the Navy A-6Es and EA-6Bs could provide them with protection.[5]

Ideally, a similar Mission Commanders' School program should be held at each of the training centers as a precursor to a joint exercise. Once the 4440th TFTG has established the Red Flag program, they should make it available to the other training centers as part of the formalized interchange proposed in recommendation 4. The author realizes that the Air Force can only recommend such a program to our sister services; there is no requirement that they accept it.

Recommendation 6: Initiate Annual Unified Command Red Flag

As was discussed in chapter 3, a limitation to the realism of Red Flag is caused by its scheduling procedures. The Red Flag exercise is not given scheduling priority to ensure that units participate with the same squadrons that they would expect to go into combat with. To enhance the joint training benefit of Red Flag, the author recommends that the DCS Plans and Operations at Air Staff take the lead to establish one Red Flag exercise per year designed around the air component of a combatant command. This would be a priority exercise with all assigned units required to participate. Some method of rotating units between the CONUS and overseas might be necessary to enable overseas-based units to participate without weakening overseas strength.

As the anticipated air component commander for any future operations, the Air Force should be the lead service to initiate this action. Since any such action will require cooperation among all the TAF, not just TAC, the Air Staff is the appropriate level to direct this initiative.

Under this recommendation, one Red Flag per year would be dedicated to the air component of a specific CINC. This is in addition to the dedicated Night Flag described earlier in this chapter. Since the emphasis for this "CINC Flag" is to develop a greater joint employment capability, the initial emphasis should be on joint daylight operations. In anticipation of ongoing force reductions and the proposed realignment of the unified command structure, this CINC Flag would rotate annually between the Pacific Force, the Atlantic Force, and the Contingency Force. This three-year rotation period matches the normal

operational tour length for the Air Force and should enable all aircrews to participate in at least one CINC Flag during their tour of duty.

Developing Joint Night Capability

Following the simultaneous development of a broad base of experience in night operations throughout the TAF and an expanded experience level in joint operations, the next phase is to begin extensive joint night training.

Recommendation 7: Expand Joint Night Training at Each Center

Drawing upon the lessons learned during the simultaneous TAF night and joint daylight phases in recommendations 1 through 6, this next phase would change the single-service Night Flag and Night Thunder into a fully integrated joint night-training exercise. Those joint tactics and procedures that were developed as a result of the first phase would now be shifted into the relatively more demanding night arena.

When to begin this phase of joint night training will depend on the lessons learned and incorporated during the TAF night and joint day development phases. The author recommends three years as a guideline. This will allow for two annual Night Flags to determine lessons learned and recommended improvements in night operations, plus a third Night Flag to validate and refine those tactics. It will also allow for one full rotation of the three CINC Flags for joint operations.

This recommendation would also include initiating a fully integrated annual joint night-training exercise at NAS Fallon, at the NTC, and at Twentynine Palms. It is at this point that the night CAS training against actual targets mentioned earlier would be developed. As was discussed in chapter 3, night CAS against live targets at either NTC or Twentynine Palms has two benefits. First, it trains aircrews in the problems of night target ID and attack in the face of enemy air and ground defenses.

Simultaneously, it provides the ground troops under attack training in the problems of operating at night in the face of a significant air threat.

Note that this is a recommendation to change the scope and nature of a currently scheduled exercise, not to add an additional exercise to the existing schedule. This will increase the opportunity for aircrews to participate in more regular joint night operations without having to incur the financial cost of creating an additional exercise.

Recommendation 8: Increase Joint Night Operations at Team Spirit

At approximately the same time as the CINC Flag program is initiated, Team Spirit should be expanded to include joint night operations. Joint night operations at Team Spirit could incorporate lessons learned from Night Thunder, Night Flag, and the joint exercises that are held in the CONUS. Since Team Spirit includes units from the Pacific theater and units deployed to Korea from the CONUS, the crews will be able to share experiences in the various programs. This should accelerate the overall learning experience for all the crews. At the same time, each of the programs can be improved by comparing the lessons learned.

To realize the maximum benefit from this recommendation, Team Spirit will need to establish a debriefing system to tie together all lessons learned from the various participants. A comprehensive debriefing similar to Cope Thunder or Red Flag is not feasible; Team Spirit is simply too large in scale over too large a geographical area. A centralized reporting system run by the Team Spirit exercise staff with daily mission reports filed by the participating units via telefacsimile then collated into an end-of-exercise report may be workable.

Recommendation 9: Develop an Annual Unified Command Exercise

After at least six years' experience with the CINC Flag program, CINC Flag should be expanded into an annual coordinated exercise that

would integrate all four of the major training centers in the CONUS with centralized tasking from a specific CINC. Six years is recommended as the minimum interval to provide each unified command the opportunity for at least two CINC Flags as building blocks before this more ambitious program.

Under this recommendation, units participating at Red Flag, NAS Fallon, Twentynine Palms, and the NTC would all be tasked together under a single campaign plan for mission objective tasking. This exercise is envisioned as a 24-hour-a-day exercise conducted simultaneously from all four training centers and using all available assets in a coordinated mission effort.

As with the previously described CINC Flags, this exercise would be a high-priority scheduling event to ensure that the correct units were available at the correct time. During a Pacific Force exercise, PACAF-tasked Air Force units, Pacific Fleet air wings, Fleet Marine Force, Pacific air and ground troops, and Pacific-tasked Army units should be scheduled simultaneously. As with the existing Red Flag, Strike, and NTC programs, units could be scheduled in 3 two-week training rotations to provide the maximum possible opportunity for participation.

Following the principle of unity of command, all air assets would be tasked by a single air component commander (ACC), similar to Operation Desert Storm. Tasking would be based upon capability, not service. Under this recommendation, Air Force CAS aircraft flying out of Nellis AFB could be tasked to augment Marine air for support of Marine ground troops at Twentynine Palms. Air Force F-15Es or F-16s, flying simulated antiship missions in support of the Navy, could strike targets at NAS Fallon while being escorted by F-14s or F-18s.

By operating from all four training centers simultaneously, the physical separation of the participating units would simulate the problems that would be caused by geographical separation in wartime. It would provide training in such possible challenges as coordinating Air Force fighter support for Navy carrier-based aircraft flying interdiction missions in support of a Marine ground war. At present, training in coordinating physically separated units is done during some

Red Flag exercises by having selected units operate out of bases other than Nellis. The recommendation applies the same precedent to a greater scope.

This recommendation should be implemented specifically in the CONUS because of the physical proximity of the already existing training centers. Close location of such diverse training facilities does not exist overseas at this time. It would be cost prohibitive to try to build such a system of training centers, even if we had the available air and land space to do so. The economic costs of attempting to establish such a system overseas outweigh the operational challenges of deploying overseas-based units back to the CONUS for training.

The author recognizes that this is an extremely ambitious and complex proposal. That is why it is recommended as the final step of a phased or building-block approach. Full implementation can be delayed as necessary to ensure that bases adequately experienced in night operations and joint operations are established before such a program is attempted. Properly planned and executed, though, it does provide a method for a full-scale training exercise in joint operations, including joint night operations. Since the exercise would be conducted on all four controlled ranges in coordination, the proposal approaches the realism of exercises such as Team Spirit, but provides a greater degree of control and feedback on results and lessons learned. The key is that all of the assets available to the air component commander of a unified command would have the opportunity to train together as a whole, not just as individual parts.

Summary

This book has discussed some of the challenges of joint force operations in night air warfare. It introduced the rationale for why we need to train for joint operations at night. Chapter 1 described some of the history of joint air operations in general and night air operations, both single service and joint. Chapter 2 presented a hypothetical joint night scenario to illustrate some of the benefits of such operations and

a few of the potential challenges. Chapter 3 described the current status of night training programs and joint training programs and identified some areas where these might be improved. Finally, this chapter recommended a building-block approach for increased training to develop an even greater employment capability in joint night air warfare. Although the desired emphasis is on joint night capability, the proposal, if fully implemented, will increase Air Force night capability as a single service and joint operations in general, both day and night. The programs recommended in this chapter are not *the* definitive training scheme for future air operations; they are a method of ensuring that we can train as we plan to fight.

Notes

1. Maj Gary Myers, Headquarters TAC, Special Management Organization-LANTIRN, telephone interview with author, 12 April 1991.

2. Maj Roger L. Smith, *USAFE: A Two-Edged Sword: Preparing USAFE for the Low-Intensity Arena* (FOUO/No Contract/NOFORN) (Maxwell AFB, Ala.: Air University Press, April 1990), 27. (Information extracted is not FOUO.)

3. Col Dennis M. Drew and Dr Donald M. Snow, *The Eagle's Talons: The American Experience at War* (Maxwell AFB, Ala.: Air University Press, December 1988), 28.

4. Capt Jane Patterson, instructor/senior director, 964th AWACS, participant in Red Flag 91-2, Nellis AFB, Nev., interview with author, 13 February 1991.

5. Capt Micah Killian, Air Force–Navy exchange officer, Attack Squadron 52 (VA-52), participant in Red Flag 91-2, Nellis AFB, Nev., interview with author, 14 February 1991.

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