Airpower versus a Fielded Force

Misty FACs of Vietnam and A-10 FACs of Kosovo—A Comparative Analysis

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Abstract

Since World War II, the United States has been involved in several limited conflicts against smaller, far less militarily capable opponents. Unlimited war with the Soviet Union, for which USAF prepared for more than 40 years, never materialized. Instead, US airpower has generally been directed against underdeveloped, authoritarian states. Such regimes tend to rely upon their armies as their primary source of power. Yet USAF, borne out of the aerial combat experience of World War II, has firmly held to airpower as the means of bypassing military forces and striking directly at the vital center of the enemy. Thus, American Airmen are predisposed to discounting the effectiveness of air attack against fielded forces. The realities of modern conflict, however, have dictated the need for direct attack on armies. Airmen with little previous training or doctrine have improvised tactics to use the equipment at hand to get the job done. This study examines two such groups of Airmen—the Misty forward air controllers (FAC) of Vietnam from 1967 to 1970 and the A-10 FACs over Kosovo in 1999.

A comparison of the Misty and A-10 FAC missions clearly demonstrates a failure of the USAF to develop a full range of suitable tactics for the direct attack of enemy fielded forces. Although the quantum leaps in weapons delivery accuracy from Vietnam to Kosovo now make it possible to destroy armor and artillery from the air, there has not been a corresponding improvement in target identification. Until USAF prioritizes the direct attack of ground forces and target identification, its ability to attack fielded forces effectively will remain limited. Drawing from the lessons of the Misty and A-10 FACs, the recommendations presented here focus on equipment, tactics and training, and doctrine. However, Airmen should understand that there is no silver bullet for the challenge of target identification. No single piece of equipment or advance in technology will solve the problem. Airmen must first develop the proper doctrine and tactics, and then take their equipment and train as realistically as possible. Only then can USAF reach its potential for defeating an enemy army in the field.

About the Author

Lt Col Phil M. "Goldie" Haun is a senior pilot with more than 2,100 hours of fighter time. He graduated from Harvard University and received his commission through the Air Force Reserve Officer Training Corps in 1986. Upon completion of undergraduate pilot training in 1989, he went on to fly A-10s at Royal Air Force Bentwaters, England. In 1993 he received a master's degree in economics from Vanderbilt University and instructed economics at the United States Air Force Academy. He also served as an A-10 flight commander at Osan AB, Korea, and an A-10 chief of standards and evaluation with the 52d Fighter Wing at Spangdahlem AB, Germany. Following graduation in 1997 from the US Air Force Weapons School, Colonel Haun returned to the 81st Fighter Squadron (FS) and served as squadron weapons officer and 52d Fighter Wing chief of weapons and tactics at Spangdahlem. He flew 37 combat sorties as an airborne forward air controller mission commander and combat search and rescue mission commander over Kosovo during Operation Allied Force. He also has flown the A-10 in Operations Provide Comfort, Southern Watch, and Decisive Endeavor. Colonel Haun is a 2001 graduate of the Air Command and Staff College, Maxwell AFB, Alabama. Upon graduation in 2002 from the School of Advanced Airpower Studies at Maxwell, he was assigned as operations officer to the 355th FS at Eielson AFB, Alaska.

Acknowledgments

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Chapter 1

Introduction

The limited conflicts in which the US military has been involved since World War II have pitted the United States against smaller, less sophisticated opponents with far less capable air forces. Though often politically constrained, the United States Air Force, in most cases, has achieved air superiority and has directed its firepower against key enemy targets. But the USAF has faced its greatest challenge in targeting by turning the advantage won in the air into military and political victory on the ground. Particularly frustrating for the USAF has been the nature of its opponents. Underdeveloped, authoritarian states with power—based on military might—have proven more difficult to target than large, industrial nations who rely on economic strength. Airmen have long voiced their belief in the fundamental advantage of airpower in bypassing military forces and striking directly into the vital center of the enemy. Yet since World War II, the USAF has been forced to attack the very battlefield it was created to avoid. Though airmen discovered initially that they were ill prepared for the task, the crucible of combat soon forced them to develop new methods for striking the enemy's fielded forces.

The techniques crafted with blood and sweat in Korea and Vietnam, however, were deemed irrelevant. Such tactics were considered outmoded as the United States prepared for the total nuclear war envisioned during the Cold War. The post–Cold War USAF de-emphasized its nuclear strike capability and turned instead to stealth and precision to deliver surgical conventional strategic attacks. Given this proclivity for strategic attack, one must ask whether the USAF has failed to develop suitable tactics for the direct attack of enemy fielded forces.

Background of Fast Forward Air Controllers

This question is best addressed by comparing the tactics used in two cases in which US airpower was required to attack enemy forces independent of friendly ground troops. In the Vietnam War, Air Force O-1 and O-2 forward air controllers (FAC) began flying visual reconnaissance missions over the southern area of North Vietnam. In response, the North Vietnamese deployed additional air defenses. As the threat in these areas became too high for these slow and vulnerable propeller-driven aircraft, new tactics were developed. Operation Commando Sabre was the first test of the "Fast FAC" concept. Jet aircraft performed FAC duties and adapted the two-seat version of the F-100 Super Sabre to the visual reconnaissance and strike control mission. Under the call sign of "Misty," F-100F

crews became widely known as "Misty FACs" and set about the task of interdicting equipment and supplies that flowed into South Vietnam. Commando Sabre Operations never consisted of more than 22 pilots at any one time and rarely involved more than six single-ship missions per day. Yet they succeeded in locating and controlling strikes on targets where other methods had failed, which led not only to the continuation of the program but also to the expansion of the Fast-FAC mission to the F-4 Phantom. Success came at a price though, as the low-altitude Misty-FAC missions proved to be some of the most dangerous flown in the Vietnam War. This case study examines the tactics developed by the Misty FACs for locating and attacking the North Vietnamese in the face of the constant threat of antiaircraft artillery (AAA).

The second case involves the more recent use of USAF airpower during Operation Allied Force in 1999. In the absence of friendly ground forces, A-10 FACs commanded 40-ship strike packages in the direct attack of the Serbian Third Army in Kosovo. Supported by suppression of enemy air defenses (SEAD) and air-to-air fighters, A-10 FACs operated overhead radar-guided SA-6 surface-to-air missiles (SAM) and Serbian MiG-21 fighter bases. A-10 FACs were given the daunting task to locate, identify, and attack Serbian armor while simultaneously minimizing collateral damage. Target identification was particularly difficult, given the steps the Serbian army took towards concealment and deception; and the potential for collateral damage was enormous as nearly a million ethnic Albanian refugees streamed toward the Albanian and Macedonian borders. The large number of AAA and man-portable SAMs dictated rules of engagement (ROE) that restricted operations at low altitude and forced A-10 FACs to develop tactics for medium-altitude visual reconnaissance.

A-10 FAC expertise resided within a small cadre of some 30 FAC-qualified pilots who flew most of the FAC missions over Kosovo. These pilots improvised tactics for the real-time use of intelligence, surveillance, and reconnaissance (ISR) assets to include joint surveillance, target attack radar system (JSTARS) and Predator unmanned aerial vehicles (UAV). Heavily loaded with general-purpose bombs, air-to-surface missiles, and rockets, A-10 FACs struck and marked targets for NATO aircraft from 10 nations. These FACs proved to be NATO's most effective use of airpower against Serbian forces deployed in Kosovo.[1]

Attacking Fielded Forces

Before examining these two case studies in depth, however, the relevance of aerial attack on fielded forces is addressed.[2] Some USAF strategic airpower theorists have argued that targeting fielded forces is of marginal importance.[3] Yet such theorists fail to recognize that, since World War II, US airpower has been directed primarily against underdeveloped, authoritarian states rather than modern, industrialized states. Such states

are usually controlled by leaders who rely on the backing of the military as a primary source of their power. The United States has enjoyed the advantage of air superiority over these small states that have not been able to afford a modern, sophisticated air force.[4] Instead, they rely upon their conventional armies, which range from large armored divisions to small groups of lightly armed militia to provide both external and internal security. Airpower's ability to attack such armies is a significant contribution to the defeat of these states. The US war in Afghanistan is an excellent example of the successful use of airpower against Taliban ground forces and its decisive role in the swift overthrow of that regime.

Skeptics have argued that armies are relatively invulnerable to attack from the air.[5] However, advances in technology have greatly improved the strike capability of air forces against mobile armies. Improvements in ISR capabilities, such as UAVs, have aided enormously in locating and identifying valid targets. Precision-guided munitions, such as air-to-surface missiles and Global Positioning System (GPS) and laser-guided bombs (LGB) delivered from medium altitude, have provided a quantum leap in the ability of airpower to kill individual armored vehicles and artillery pieces. Finally, the survivability of strike aircraft has likewise improved. Electronic countermeasures (ECM), coupled with SEAD coverage and jamming assets, allow US fighters to operate above the single-digit radar SAMs of most rogue states.[6]

The ability to attack an enemy ground force effectively from the air can be of considerable importance when it leads to the achievement of military and political objectives with minimal exposure to risk of US and allied ground forces. The goal of any commander should be to achieve objectives with minimum risk. Airpower provides a powerful weapon in this process if trained and experienced warriors wield it. Even if the attack of fielded forces is not considered the most efficient use of airpower by many contemporary airpower theorists, airpower has been used as such in every US war from World War I to Afghanistan. Even if USAF leaders are reluctant to employ airpower in this manner, it seems that circumstances will compel them to do so, thus making tactics for such an eventuality a task to be mastered and maintained.

It should be recognized, however, that the direct attack of mobile fielded forces is fundamentally different from the more traditional airpower roles of strategic attack and air interdiction (AI) against fixed targets. While many of the skills and techniques required for close air support (CAS) are needed, the fact that target identification is not provided by friendly ground forces changes the very nature of the mission. In addition to threat avoidance and accurate weapons delivery, aircrews must be trained in target acquisition, which will continue to pose the most difficult challenge to direct aerial attack.

Scope

This study addresses the difficulties of Misty FAC and A-10 FAC operations by asking these questions: What contextual situation in Vietnam and Kosovo warranted the use of Fast FACs in operations independent of friendly ground forces? What tactics did the Misty and A-10 FACs develop to locate, identify, attack, and assess the enemy? What were the advantages and disadvantages of the F-100F and A-10 airframes for FAC operations? What ISR assets did Misty and A-10 FACs have available for operations, and how did pilots compensate for any shortfalls? What weapons capabilities and limitations did Misty and A-10 FACs have for striking and destroying targets? What were the threats and how were they dealt with? How did the ROE affect operations? What was a typical mission profile? How was battle damage assessment (BDA) collected and incorporated into the intelligence system? What weaponeering issues were the most challenging? What were the training and manning requirements of the mission? What were the qualities of a good FAC? How did nighttime affect operations? How did Misty and A-10 FACs contribute to combat search and rescue (CSAR) missions? What occurred between Vietnam and Kosovo that caused the de-emphasis of the Fast-FAC mission? What lessons applied to both theaters and remain relevant today? What steps should USAF take to rectify weaknesses in operations against fielded forces?

Methodology

This study focuses on how Misty and A-10 FACs developed tactics to attack enemy ground forces effectively from the air. It also considers whether the lessons garnered at the precious price of blood and treasure in Vietnam were lost on the next generation of tacticians as they prepared for combat. While this study addresses many of the issues arising from such a complex mission, it leaves two key questions unanswered. First, what emphasis should be given the direct attack of fielded forces with respect to strategic attack? In response, it is assumed that the attack of fielded forces is important. Political conditions have repeatedly required attacking fielded forces. Second, what is the most effective use of airpower against ground forces? This study does not intend to argue the merits of joint warfare. Political restrictions prevented the use of friendly ground forces in North Vietnam and Kosovo, which forced airpower to go it alone.[7] In other cases, as in the Persian Gulf War of 1991, airpower may be called upon to prepare the battlefield in advance of a ground invasion. Either way, airpower must be prepared to operate in an independent manner against an enemy's army.

Sources

In comparing the Misty FAC and A-10 FAC operations, primary source documents were used to the greatest extent possible. For Misty-FAC operations, three major collections were reviewed. The USAF Historical Research Agency has a wealth of recently declassified documents on Vietnam—including oral histories, various US Pacific Air Forces' Contemporary Historical Examination of Current Operations studies on air operations of the Vietnam War—and particularly valuable 37th and 31st Fighter Wing and Commando Sabre Operations histories.[8] A book published in 2002, *Misty: The First Person Stories of the F-100 Misty Fast FACs in the Vietnam War,* contains the personal combat experiences of the pilots and provides not only the tactics employed but also insights into the overall effectiveness of Misty operations and the Vietnam War.[9] Finally, a questionnaire was sent to the surviving Misty FACs, which focused on the suitability of the F-100F for Fast-FAC operations and the tactics developed for visual reconnaissance, strike control, and threat avoidance. Though this survey was conducted more than 30 years after the fact, the responses underscore many of the primary challenges of the Fast-FAC mission.[10]

The A-10 FAC operations discussion is extracted from Air University Press's book, *A-10s over Kosovo: The Victory of Airpower over a Fielded Army as Told by the Airmen Who Fought in Operation Allied Force.* This book provides firsthand experiences of fighting the Serbian Third Army from the air. Other personal experiences are provided from war diaries and interviews with A-10 FACs, along with the results of a questionnaire conducted by the 81st Fighter Squadron (FS) at the end of Operation Allied Force in late June 1999.

A comparison between the Misty FACs of Vietnam and the A-10 FACs of Kosovo yields four major contributions to our understanding of air war doctrine. First, airpower has been called upon to attack enemy armies since the advent of the airplane. These two case studies demonstrate the relevance and challenge of targeting ground forces from the air without the aid of friendly ground forces. Second, these two cases, separated by both time and space, provide fascinating insights into the ability of airmen to innovate in the face of an intelligent and ever-adapting enemy. Likewise, the courage and airmanship of those who flew these missions reveal the human dimension of combat that is so often forgotten in discussions of modern airpower. It is the warrior spirit, not technology, which proves itself on the field of battle. Third, improvements in weapons employment from Vietnam to Kosovo have not been matched by similar strides in target identification. The most challenging task for airmen today is to locate the target. Fourth, shortfalls in USAF equipment, training, and doctrine are identified and some remedies are proposed. Confession is the first step towards recovery. Only with the recognition of its failures can improvements to USAF operations be forthcoming.

Notes

1. Christopher E. "Kimos" Haave and Phil M. "Goldie" Haun, *A-10s over Kosovo: The Victory of Airpower over a Fielded Army as Told by the Airmen Who Fought in Operation Allied Force* (Maxwell AFB, Ala.: Air University Press, December 2003), xvii.

2. Air Force Doctrine Document 2-1.3, *Counterland,* 27 August 1999. Current Air Force doctrine limits the USAF definition of Air Force counterland missions, interdiction, and CAS to how these missions relate to friendly ground forces.

3. John A. Warden III, "The Enemy as a System," *Airpower Journal,* spring 1995, 52.

4. Enemy states, however, have had sophisticated air defense weapons and integrated air defense systems.

5. Warden, 54.

6. Single-digit surface-to-air missiles (SAM) include radar-guided SA-2s, 3s, 6s, and 8s, as opposed to more modern SA-10s and SA-12s and double-digit SAMs that are currently limited in availability outside the former USSR states.

7. In the case of Misty FACs, the fear of retaliation from China and the Soviet Union prevented friendly ground forces from threatening an invasion of North Vietnam. In the case of A-10 FACs, President William "Bill" Clinton announced prior to the commencement of hostilities that ground troops would not be used.

8. Contemporary Historical Examination of Current Operations—CHECO—was the codename for a large number of classified studies conducted by Pacific Air Forces on air operations in Vietnam.

9. Donald W. Shepperd, ed., *Misty: The First Person Stories of the F-100 Misty Fast FACs in the Vietnam War* (Austin, Tex.: Misty FAC Foundation, 2002).

10. One hundred twenty of the 155 Misty-FAC pilots were alive at the time of this research, of whom 40 responded to the questionnaire. The following questions were asked of them: What was the typical combat load for a standard day FAC mission? What considerations drove these load-outs? How did this load-out change for night operations? What were the primary methods for avoiding the threat (altitude, jinking, and single passes)? Which threats were of greatest concern to you, and how did you counter them? How well prepared/trained did you feel for conducting Misty-FAC operations? Did previous close air support experience sufficiently prepare you for the Misty-FAC role? How effective did you believe Misty-FAC operations were at conducting interdiction operations? What were the primary limitations to more successful operations? They were asked to describe the following: the strengths and weaknesses of the F-100F in performing the FAC role (include both visual reconnaissance and air strike control); your tactics for visual reconnaissance for a typical target; your tactics for controlling strikers onto a typical target; your tactics for marking a target (rockets, talk-on, flare, and gun); a typical mission (mission duration, number of tankers, time in target area, time spent in visual reconnaissance, and a typical air strike control); how you executed each maneuver; the upgrade program you underwent to qualify as a Misty FAC (include any prerequisites, such as time/sorties in country, flight lead, volunteer, etc.).

Chapter 2

History of Air Interdiction from World War I through Vietnam

Since the days of biplanes, one of airpower's most sought-after applications has been its potential to engage enemy ground forces. Today, such counterland operations are classified into two missions: CAS and AI.[1] Whereas CAS deals specifically with air operations in the close proximity of friendly ground troops and requires detailed coordination, AI engages the enemy before it reaches the battlefield. According to USAF doctrine, AI is employed "to divert, disrupt, delay, or destroy the enemy's surface military potential before it can be used effectively against friendly forces."[2] History is replete with battles decided by forces that did not arrive in time to fight. In the twentieth century, AI has greatly hindered the movement of men, weapons, and supplies for those armies who have lost the vertical battle for air superiority.

There are five key components of successful AI operations. First, as with most air operations, air superiority is a prerequisite. The ability to operate unhampered in a reduced threat environment greatly increases airpower's ability to identify, attack, and assess targets. Air superiority requires suppression of both enemy aircraft and surface-to-air threats. Second, the ability to identify targets is paramount. Weather, terrain, vegetation, and enemy nighttime movement combine to degrade the ability to identify valid targets from the air. Intelligence and various on- and off-board sensors have, to varying degrees, aided airmen in acquiring targets; but target identification remains the most limiting factor in air operations. Third, AI must be a sustained operation. To be successful, the flow of supplies must be slowed to the point where it restricts the enemy's ability to attack or defend. Persistence and continual pressure is required. Fourth, the characteristics of enemy lines of communication (LOC) have considerable bearing on the overall effect of an interdiction campaign. The length of LOCs, presence of enemy choke points, and concentration of supplies determine the availability of lucrative targets.[3] Fifth, the enemy's rate of consumption of supplies and the level of existing stockpiles determine the effectiveness of AI. An enemy in heavy combat and generating a high rate of consumption with limited reserves is rendered more vulnerable to interdiction.[4]

Air Interdiction from World War I to the Korean War

Aviation was initially used for observation and artillery spotting in direct support of ground operations in World War I. Soon, however, airmen began mounting machine guns and loading bombs onto their aircraft, and new

missions emerged that included AI.[5] Early in the war French and British air forces began to target German trains, railroads, and depots in an effort to decrease flow of supplies to the front.[6] The reliance of Germans on rail transportation and the relative ease with which airmen could identify these targets made them susceptible to attack. Even with formation of the Royal Air Force (RAF) for the express purpose of targeting German industry, transportation was ranked only behind chemical and steel works on the target-priority list for the heavy bombers of the RAF Independent Force.[7] Although British bombers often failed to locate their industrial targets, they often bombed interdiction targets of opportunity; RAF never applied a concentrated effort to reduce the flow of men, equipment, and supplies to the German trenches.[8]

Operation Overlord, the Allied invasion of France at Normandy, illustrates not only the maturation of airpower from World War I to World War II but also the importance of AI in the outcome of the land battle. The Allies had learned many lessons on the application of airpower from their campaigns in North Africa and Italy.[9] By Normandy, the importance of air superiority was well understood and the destruction of the Luftwaffe by the armada of B-17s and P-51s of the Eighth Air Force and P-47s of the Ninth Air Force prepared the way for the ensuing ground invasion.[10] With air superiority achieved, the Allies focused on the interdiction of German LOCs, which isolated German forces from reinforcement. Three months prior to D day, US and RAF bombers were redirected from strategic bombing to a sustained AI operation against the German transportation system in France.[11]

As in World War I, the German army relied heavily on the French railways. French railheads were not only easily targeted by air but also provided key choke points for the flow of German supplies. Daylight attacks on German convoys by Allied tactical air further reduced the flow of supplies. The German commander in France, Field Marshal Karl von Rundstedt, later stated that it was the AI of railways and daylight convoys that prevented a successful German response to the invasion at Normandy.[12] The overall success of Allied AI in support of Operation Overlord is credited to a combination of Allied air superiority, a sustained AI campaign, the ease of identifying and attacking enemy LOCs, and a German army desperately in need of resupply and reinforcement as it tried to hold back the Allied advance in France and Belgium. However significant air operations in the victory over Germany, air interdiction was not the postwar talisman that US airmen desired. It was strategic bombing that provided the justification needed for an independent air force, thereby leaving the lessons of AI neglected during the postwar drawdown. Such lessons would soon be relearned in the skies over Korea.

US AI in Korea began with operations against the North Korean forces attacking US ground forces along the Pusan perimeter. Air support continued to be critical during the subsequent breakout of US ground forces in the fast-paced march to the Yalu River in autumn of 1950. Although

short of airfields and tactical aircraft, US airmen neutralized the Korean rail network, an accomplishment that forced the North Koreans to move supplies by convoy across already overextended supply lines. New US F-80s and surplus World War II F-51s were employed against truck convoys by day, which limited the North Koreans to nighttime movement.[13] The North Korean army, short of food and other essentials, lacked the moral and physical strength to repel the US breakout at Pusan.[14]

The counterattack on 26 November 1950 of more than 200,000 Chinese troops across the Yalu River signaled a new stage in the Korean War.[15] US AI efforts during this phase proved less effective than previous efforts for four reasons. First, the introduction of Chinese fighter aircraft and a buildup of antiaircraft weapons along Chinese LOCs signaled the end of unopposed US air operations.[16] After losses of aircraft to Chinese MiGs, B-26 and B-29 daylight missions over North Korea were discontinued.[17] Visual reconnaissance and bombing accuracy were also affected as aircrews were forced to react to the air defenses. Second, the USAF needed tactical aircraft for sustained and persistent air operations against the Red Army.[18] The deemphasis of tactical aviation, along with the post–World War II reduction in forces, shorthanded the USAF in dealing with the widening scope of interdiction operations. Third, the Chinese adapted their tactics and stepped up the use of camouflage and deception, which reduced the size of their convoys and introduced nighttime convoy operations. Fourth, the stalemate of the ground war lowered the consumption rates of the Red Army, which left it less vulnerable to AI.[19]

Overall, US AI operations in the Korean War produced mixed results. USAF showed little concern over any weaknesses highlighted during the conflict and preferred to view the war as an aberration with little to be learned or applied toward the conduct of future air operations. Because of a penchant for ignoring past lessons, USAF was ill prepared to conduct AI in Vietnam a decade later.

Vietnam: The Interdiction Campaign

Prior to August 1964, US military presence in South Vietnam was limited to that of an advisory role. Due to the instability within the South Vietnamese government, President Lyndon B. Johnson questioned Saigon's ability to withstand the increasing threat from North Vietnam.[20] In the wake of the Gulf of Tonkin incident of 2 August 1964, Johnson's position shifted towards more aggressive and offensive measures, which ultimately led to the commencement of the Rolling Thunder air campaign in March 1965. Johnson's primary goal for Rolling Thunder was to demonstrate to Hanoi the resolve of the United States, as he believed that a series of graduated air strikes on North Vietnam would cause Hanoi to withdraw support from the Vietcong in South Vietnam.[21] A secondary goal was to increase morale within Saigon and to help stabilize the South Vietnamese

government. Additionally, the air strikes were to limit the flow of reinforcements, weapons, and supplies to the Vietcong.[22]

While Rolling Thunder was an offensive campaign, it did not meet the strategic air campaign envisioned by Chief of the Air Force Curtis E. LeMay and his Air Staff.[23] Target selection was reserved exclusively for President Johnson and was conducted during the infamous Tuesday rose garden luncheons. These limited air strikes alone, however, did not achieve Johnson's objectives; by July 1965, he concluded that victory in Vietnam would require a protracted campaign with more emphasis on military action in South Vietnam.[24]

As the Johnson administration shifted its emphasis toward ground operations and increased US troop strength, it also elevated the importance of CAS and the interdiction of supplies from North Vietnam to the Vietcong in the south.[25] Under the direction of Military Assistance Command, Vietnam, (MACV) commander, Gen William C. Westmoreland, the US Army concentrated on direct military action in South Vietnam against Vietcong and North Vietnamese regular forces. These ground operations, which were restricted to South Vietnam, relied heavily on CAS.[26] The Air Force provided CAS within South Vietnam and conducted the Rolling Thunder strikes in the North, which included interdiction missions.

The North Vietnamese logistics and transportation system was centered in Hanoi. The rail system accommodated supplies from China by land, but Haiphong received shipments from the Soviet Union by sea. These were then moved along rail and major road routes toward the South and transferred to smaller convoys, which maneuvered along a series of redundant roads and trails. The supplies were dispersed as they approached the demilitarized zone (DMZ) and were carried by truck, bicycle, or packed on foot along trails at night. The North Vietnamese also moved supplies through the Laos panhandle in order to more easily access Vietcong positions in central and southern South Vietnam. Known as the Ho Chi Minh Trail, this network of thousands of miles of redundant roads concealed North Vietnamese trucks under a dense triple-canopy forest.[27] The interdiction campaign from Hanoi to South Vietnam focused on four areas: on the Rolling Thunder air campaign in North Vietnam in Route Packages (RP) IV, V, and VI; on the area in southern North Vietnam near the DMZ in RP I; on the Ho Chi Minh Trail in southern Laos; and on trails within South Vietnam (see map 1).[28]

The most lucrative targets were those found at the head of the transportation system around Hanoi.[29] These included railheads, major bridges, and repair and support facilities for the entire logistics systems. However, many of these targets were within the restricted and prohibited zones imposed by the Johnson administration around Hanoi and Haiphong Harbor and were thus off limits to attack for much of the war.[30]

Interdiction near the DMZ and along the Ho Chi Minh Trail proved more difficult.[31] Bombing the roads was ineffective due to the redundancy of road systems and the relative ease with which the roads were repaired.[32]

Map 1

Southeast Asia, Including Route Packages and Ho Chi Minh Trail

For interdiction to be effective, convoys had to be attacked directly. Target identification was further complicated as the North Vietnamese adapted to traveling at night and in poor weather. The interdiction campaign in South Vietnam, Laos, and near the DMZ in North Vietnam instead relied heavily on airborne FACs for target identification and strike control. Three types of aircraft were used for these missions: slow-moving, propeller-driven aircraft; armed cargo aircraft; and jet fighters.

The 19th Tactical Air Support Squadron (TASS) began deploying 22 Cessna O-1 Bird Dogs and 44 FAC pilots in June 1963 in support of the South Vietnamese Air Force.[33] By January 1965 the number of FAC pilots in Southeast Asia had grown to 144. An additional three TASSes were activated in March and 224 FACs were in country by December.[34] Their number had increased to 668 by October 1968 and were operating more than 324 O-1 and O-2A Super Skymaster aircraft in five TASSes.[35] In 1968 alone, these aircraft flew more than one third of the total US combat time in Vietnam, which averaged more than 29,000 flying hours a month.[36]

O-1 Bird Dog and O-2A Super Skymaster

The single-engine O-1's advantage was in its slow speed and extended loiter capability, which allowed controllers ample time to observe enemy positions and control strikes. In June 1965 General Westmoreland divided South Vietnam into sectors that could be patrolled by the O-1 on a daily basis.[37] Though always in high demand for CAS and visual reconnaissance missions, the O-1 had its limitations: slow speed that delayed response time and, once alerted, limited target marking and night-flying capability that was susceptible to enemy ground fire. The introduction of the two-engine O-2 in 1966 somewhat improved


OV-10 Bronco Marking a Target in South Vietnam

speed, target marking, and night capability but did little to enhance survivability.[38] The introduction of the OV-10 Bronco in 1968 brought in more firepower, but, while the OV-10 was less susceptible to small arms fire, it was still vulnerable to larger AAA and SAMs.[39]

To increase tactical air's ability to support the Army at night, the Air Force introduced the first gunships to South Vietnam in 1965. The AC-47 Spooky was a C-47 fitted with 10 side-firing, 30-caliber machine guns. The AC-47 had a long loiter time, could fire accurately above 3,000 feet (ft), and had flare dispensers. Spooky's potential was soon realized during CAS missions, and its role expanded to include strike and flare missions along the Ho Chi Minh Trail.[40] The success of the AC-47 led to the introduction of the AC-119K and to the development of the AC-130 by 1967. With an improved fire control system, increased firepower, and sensors for better night capability, the AC-130 proved to be the best truck-killing platform of the war.[41]

AC-47 Spooky

By the spring of 1967, the success of US military activity in South Vietnam, Laos, and North Vietnam convinced communist states that the North Vietnamese needed additional support. The Soviets increased shipments of SAMs, AAA, and small arms, which made the O-1 and O-2 FAC and AC-130 operations along the Ho Chi Minh Trail and DMZ considerably more dangerous.[42]

Operation Commando Sabre and Misty-FAC Operations in 1967

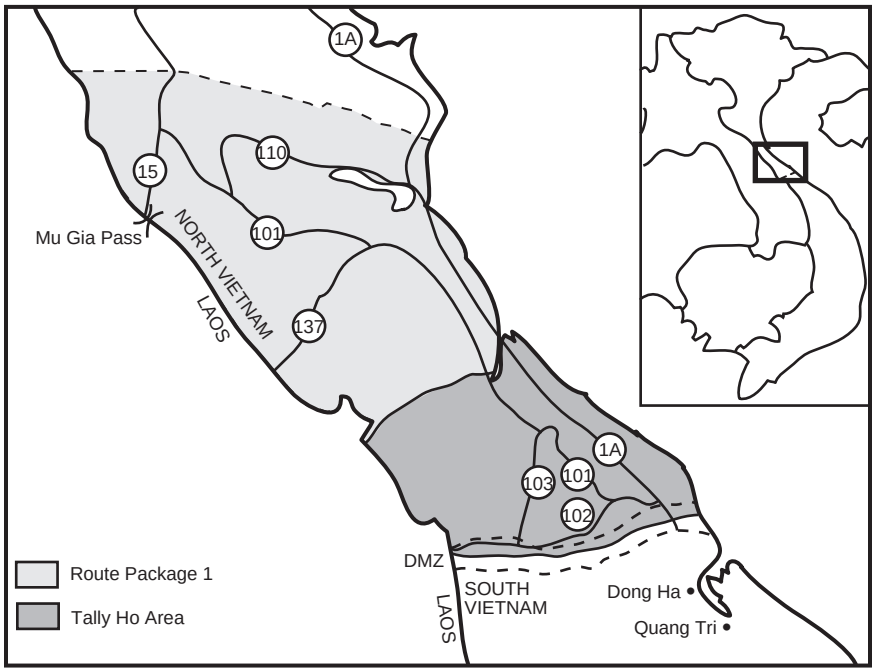
The influx of antiaircraft weapons into RP I and the Laos panhandle had significantly increased the risk to US FACs by May 1967. In response to the loss of two O-1s to SA-2 SAMs, Seventh Air Force commander Lt Gen William W. Momyer approved a test program to place FACs into the rear seat of fighter aircraft.[43] Their higher speed, which allowed fighters

to operate in high-threat areas, was deemed too dangerous for the slow O-1s and O-2s. Code-named Operation Commando Sabre, the initial test selected the F-100F—the two-seat version of the North American F-100 Super Sabre—to fly single-ship missions.[44]

Under the call sign of "Misty," these Fast FACs became known as "Misty FACs."[45] Their mission was to "impede the enemy logistic flow within and through RP I/Tally Ho to the maximum extent possible" (see map 2). They were also to "suppress enemy defenses as practicable to maintain a permissive environment for strike reconnaissance and FAC operations."[46]

Map 2

Route Package I and Tally Ho Area



On 28 June, the Commando Sabre mission was assigned to Detachment 1 of the 416th Tactical Fighter Squadron (TFS), 37th Tactical Fighter Wing (TFW), stationed at Phu Cat, South Vietnam.[47] The 37th TFW consisted of two squadrons of F-100s.[48] Commando Sabre came with neither aircraft nor maintenance and relied instead on the 37th TFW to supply both.

Though the F-100 was suitable for the Fast-FAC mission, it was the tactical innovation of pilots who volunteered for this new mission that brought about its success. Commando Sabre Operations initially consisted of 16 to 18 pilots and a dedicated intelligence officer.[49] The pilots included a commander and an operations officer primarily from the 37th TFW along with other F-100 units in Vietnam who provided extra pilots on a temporary duty basis.[50] Initially, four FACs from the 504th Tactical Air Support Group were also included to instruct the F-100 pilots in FAC

techniques.[51] The lengthy operations at low altitude and over heavily defended territory made the Misty-FAC mission extremely dangerous. Pilots were, therefore, solicited on a volunteer basis to perform the duty for 120 days or 75 missions, whichever came first.[52]

F-100 on Landing Roll at Phu Cat

All F-100 pilots selected for Misty had combat experience in CAS missions in South Vietnam. Some also had prior FAC experience, and some who had flown jets in Europe from which the refueling probes had been removed were not qualified for aerial refueling. The checkout program consisted of on-the-job training in the rear cockpit with an experienced Misty FAC in the front. The FAC would also demonstrate visual reconnaissance, strike control, and BDA techniques.[53] By the beginning of July 1967, Commando Sabre Operations were scheduling two sorties a day, with a single air refueling per sortie.[54] Initially unopposed, Misty FACs began encountering small arms and AAA fire on 5 July, after which enemy ground fire became common.[55] Through July and August, the Misty FACs continued to refine their tactics and sharpened their skills at visual reconnaissance and air-strike control. They located truck parks, bridges, and air-defense sites. In July alone, Misty FACs flew 82 missions and directed 126 strikes.[56] Although Misty FACs could locate and mark the targets, the inability of fighters to drop unguided bombs for direct hits on such hardened targets as AAA pieces caused reduction of the overall extent of battle damage.

The first setback for the Misty FACs occurred on 26 August 1967 when Misty commander Maj George "Bud" Day and Capt Corwin M. Kippenhan conducted visual reconnaissance of an active SAM site 20 miles north of the DMZ. They were forced to eject when their F-100F was hit by 37-millimeter (mm) flak.[57] While Kippenhan was rescued, Major Day was eventually captured.[58] From July 1967 to October 1968, Misty FACs flew 1,498 sorties over Tally Ho and RP I, which lost nine aircraft for a loss rate of 6.01 per thousand sorties.[59] Of the 18 pilots who ejected, 12 were rescued, three were captured, and three were listed as missing in action (MIA).[60] From November 1968 to May 1970, interdiction operations shifted

to Laos, for which Misty FACs flew a total of 3,072 sorties that lost 11 aircraft for a loss rate of 3.58 per thousand.[61] Of the 22 pilots who ejected, 18 were rescued and four were listed as MIA.[62] Misty-FAC missions had a loss rate more than three times as high as that of the wing's other F-100s, which conducted CAS and strike missions.[63]

Operation Neutralize began on 12 September 1967. It was a six-week effort to suppress heavy North Vietnamese artillery attacks on US positions across the DMZ.[64] O-2 FACs controlled strikes south of the DMZ while Misty FACs focused attacks on artillery positions in the area just north of the border between North and South Vietnam. Misty-FAC success was heralded in a Seventh Air Force message to Pacific Air Forces (PACAF). It stated that the "F-100F program has proven highly successful in identification of targets and BDA in areas where O-1 and O-2 cannot operate."[65] The message also requested an expansion of Misty operations to include additional sorties and extended coverage in Laos. With the onset of poor weather in RP I in November, Misty operations began in sections of the Laos panhandle.[66]

Tet Offensive and Misty-FAC Operations in 1968

On 30 January 1968 the North Vietnamese commenced a conventional ground offensive into Vietnam during their traditional Tet holiday.[67] US air efforts focused throughout January and February on CAS in South Vietnam.[68] The elevated consumption rate of supplies incurred by the offensive forced the North Vietnamese to increase the number and size of truck convoys. Though the northeast monsoon season severely hampered Misty-interdiction efforts in January and February, March ushered in clearer skies and a higher interdiction success rate. The most successful Misty-FAC mission, the Great Truck Massacre of 20 March 1968, is regarded as the day that Misty FACs located and controlled strikes on a large truck convoy, which damaged or destroyed 79 trucks.[69] Misty FACs' detailed knowledge of the terrain and North Vietnamese defenses in RP I and Tally Ho proved invaluable not only for FAC operations but also for rescue efforts. Misty FACs assisted in several successful CSAR operations that located the position of downed aircrew and suppressed enemy ground fire for rescue helicopters.[70] In May and July the Misty FACs' versatility was also demonstrated when they began spotting for naval gunfire on fixed positions in RP I.[71]

Misty FACs' capability to locate and strike trucks did not go unnoticed by the North Vietnamese. In response, they began movements of supplies during poor weather and at night. By June 1968, Tally Ho and RP I were free of daylight enemy-truck traffic.[72] On 12 and 13 June, Misty FACs conducted two night sorties to test the F-100F for night visual reconnaissance. The results were positive, and Seventh Air Force gave immediate approval for night operations in RP I. While Misty FACs flew 46 night sorties

in July and August, regularly scheduled night missions were discontinued on 21 August.[73] Continual difficulties in marking targets and conducting attacks, coupled with the risk of midair collision, plagued night-strike control. Night sorties were then irregularly scheduled until completely halted in October.[74]

The success of Misty-FAC operations was somewhat offset by the limited number of F-100F airframes available and the plans for the jets' removal from Vietnam by 1970. In response, Seventh Air Force turned to another multirole fighter to augment and eventually replace the F-100F. The first F-4s to join the Fast-FAC mission were those of the 366 TFW at Da Nang Air Base. Misty FACs flew F-4 pilots in the backseat of F-100Fs on upgrade and area-orientation sorties. Select Misty-FAC pilots also went to Da Nang to fly with the F-4 Stormy FACs to complete their checkout.[75]

Another initiative introduced in August 1968 was the Sun Valley test, a hunter-killer concept that capitalized on the F-100 strikers already collocated with Operation Commando Sabre at Phu Cat.[76] The F-100 strikers carried a full load of bombs and flew at medium altitude, which trailed several miles behind a faster and more maneuverable Misty FAC on visual reconnaissance at low altitude. Once targets were located, the F-100 strikers were already in position for a quick attack. While the concept showed great potential, the loss of two Misty aircraft compelled Seventh Air Force to direct a review of operations. It was concluded that the North Vietnamese restriction on daylight movement had been forcing Misty FACs to increase their exposure time in locating targets. Seventh Air Force then imposed restrictions to reduce exposure time, which temporarily halted hunter-killer operations and reduced the overall effectiveness of Misty FACs in locating valid targets.[77]

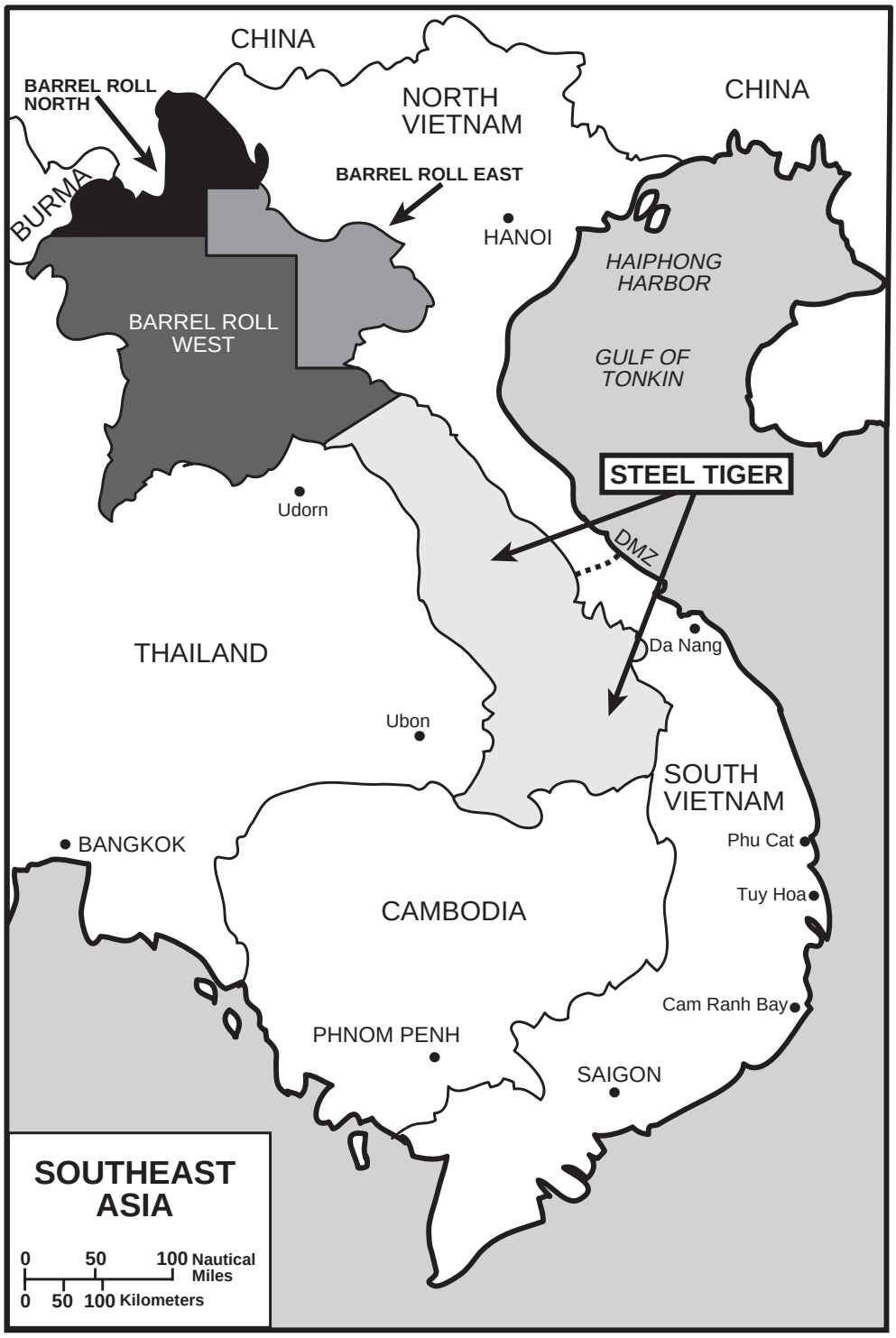
President Johnson's November 1968 Bombing Halt and Misty-FAC Operations in Laos in 1969

Misty FACs continued flying missions into Tally Ho and RP I until President Johnson issued the Executive Order on 1 November 1968 that prohibited bombing in North Vietnam.[78] Attacks were then shifted into Laos and redirected the Misty-FAC mission to visual reconnaissance of the southern areas of Steel Tiger in the Laotian panhandle (see map 3). The lower AAA threat in Laos further allowed Misty FACs to perform visual reconnaissance at lower altitude and to reintroduce hunter-killer tactics.[79]

February 1969 brought the additional task of photoreconnaissance to the mission. While Misty FACs had been using 35 mm high-speed cameras in the rear cockpit to photograph potential target areas for some time, Operation Search had formalized a working arrangement between Misty and the 460th Tactical Reconnaissance Wing.[80] This was a four-month-long effort to familiarize RF-4C crews with Misty-FAC tactics.[81] Misty FACs also continued to demonstrate their prowess at AAA suppression during

Map 3

Areas of Operation in Laos in 1969



rescue operations. As the weather improved through the spring and as Misty FACs became more and more familiar with the Laotian terrain, the number of targets identified and attacked began to rise.[82]

It was during this period that the 37th TFW at Phu Cat converted from the F-100 to the F-4D. In May, Misty-FAC operations deployed with the 416th TFS to Tuy Hoa Air Base where F-100 operations continued with the 31st TFW.[83] Misty's area of responsibility expanded in August from the southern areas of the Laotian panhandle to include the entire Steel Tiger region.[84] However, the number of daily missions scheduled was reduced from seven to five at the behest of the 31st TFW, which was in need of additional F-100F airframes to train incoming F-100 pilots.[85] In response to the overall lower experience level of the 31st TFW F-100 pilots, the Misty FACs were forced to reevaluate their own manning and training program. Approximately one-half of the pilots that they began to receive were inexperienced. The inexperienced pilots flew with Misty-FAC instructors and completed a FAC-upgrade program prior even to becoming flight leads.[86]

In October 1969 the number of daily missions scheduled was further reduced from five to four, and a theaterwide shortage of tanker support cut back the length of each mission.[87] Misty-FAC time on station was reduced from 10 hours a day, based on a six-sortie schedule, to just under three and one-half hours with the four-sortie schedule. A combination of good weather, increased ground activity, and the arrival of three replacement F-100Fs in early 1970 returned the daily schedule to six missions, but the lack of tanker support continued to limit on-station times.[88]

The loss of two aircraft on 18 and 19 January, along with eight hits on aircraft in just 19 days, brought about a change of tactics for Misty operations. Whereas visual reconnaissance had been conducted at altitudes as low as treetop level, Seventh Air Force raised the altitude to 4,500 ft above ground level (AGL) and confined strafing to the support of rescue missions only.[89] This greatly reduced the ability to visually acquire targets and forced Misty FACs to rely more heavily on photographs shot by the backseater.

The additional loss of an aircraft in late March and heavy battle damage of aircraft in late April and early May compelled Seventh Air Force to bring the entire Commando Sabre program under review. Given the limited number of available F-100F airframes and experienced pilots, it was determined that Misty-FAC operations should no longer be continued. The Commando Sabre Operation was officially terminated on 14 May 1970.[90] Although the F-100F was no longer used, the F-4D continued flying Fast-FAC missions through the end of the Vietnam War.

Notes

1. Air Force Doctrine Document (AFDD) 2-1.3, *Counterland,* 27 August 1999, v.
2. AFDD 1, *Air Force Basic Doctrine,* September 1997, 48.
3. Eduard Mark, *Aerial Interdiction: Air Power and the Land Battle in Three American Wars* (Washington, D.C.: Center for Air Force History, 1994), 5.

4. Ibid., 402.

5. Benjamin Franklin Cooling, ed., *Case Studies in the Achievement of Air Superiority* (Washington, D.C.: Center for Air Force History, 1994), 3.

6. Mark, 9.

7. George K. Williams, *Biplanes and Bombsights: British Bombing in World War I* (Maxwell AFB, Ala.: Air University Press, 1999), 178.

8. John Buckley, *Air Power in the Age of Total War* (Bloomington, Ind.: Indiana University Press, 1999), 60.

9. Alan Stephens, ed., *The War in the Air: 1914–1994* (Fairbairn, Australia: Air Power Studies Centre, 1994), 108.

10. Buckley, 150.

11. William Momyer, *Air Power in Three Wars* (Washington, D.C.: Office of Air Force History, 1985), 164.

12. Ibid., 166.

13. Mark, 271–72.

14. Ibid., 281.

15. Momyer, 169.

16. Mark, 314.

17. Max Hastings, *The Korean War* (New York: Simon and Schuster, 1987), 265.

18. Mark, 317.

19. Ibid.

20. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), 40, 49. Nguyen Khanh had taken power in South Vietnam by a coup on 30 January 1964. By August, his government was under threat and of grave concern to US President Johnson's advisors. Khanh resigned 25 February 1965 and was replaced by Phan Huy Quat. Quat was overthrown in a coup by South Vietnamese officers on 12 June 1965. John Schlight, *The War in South Vietnam: The Years of the Offensive, 1965–1968* (Washington, D.C.: Office of Air Force History, 1988), 16. Three attacks by North Vietnamese regulars and the Vietcong are noteworthy: Bien Hoa Air Base mortar attack in November 1964; the Christmas Eve bombing of Brink Hotel American barracks in Saigon; and Bien Gia battle at the end of December defeated a Vietnamese marine battalion and two Army Republic of Vietnam ranger companies.

21. Clodfelter, 60.

22. Ibid.

23. Momyer, 13. The Air Staff had proposed a strategic air campaign consisting of 94 targets in North Vietnam.

24. Clodfelter, 71. Johnson's acceptance of Secretary of Defense Robert S. McNamara's proposals followed a McNamara fact-finding trip in July 1965.

25. Clodfelter, 70. Johnson increased US troop strength to 82,000 in late April 1965 and further approved in July an increase to 175,000. Schlight, 33.

26. Schlight, 42.

27. Mark, 331.

28. Momyer, 174.

29. Ibid.

30. Ibid., 184.

31. Gary Robert Lester, *Mosquitoes to Wolves: The Evolution of the Airborne Forward Air Controller* (Maxwell AFB, Ala.: Air University Press, 1997), 151–57. Interdiction in southern Laos included operations Steel Tiger, Tiger Hound, Cricket, and Commando Hunt I–VII. Momyer, 217. Interdiction in RP I was known as Tally Ho.

32. Mark, 335.

33. Lester, 110.

34. Ibid., 114.

35. Ibid., 117.

36. Ibid.

37. Ibid., 121.
38. Ibid., 111.
39. Ibid., 133.
40. Schlight, 91.
41. Schlight, 237; Mark, 336; and Momyer, 211.
42. Lester, 129; and Momyer, 217.
43. *The Air Force in Southeast Asia: FAC Operations, 1965–1970* (Washington, D.C.: Office of Air Force History, n.d.), 173.
44. The F-100F was the two-seat variation of the single-seat F-100C multirole fighter-bomber. It was originally designed for use in initial F-100 training and for upgrade and orientation sorties. Operation Commando Sabre continually competed for the use of F-100Fs against the required upgrade sorties for newly arrived F-100C pilots.
45. Lester, 170.
46. Extract, Seventh Air Force OPORD (draft) 504–67, 28 June 1967. Contained in History, Commando Sabre Operations, July–September 1968, United States Air Force Historical Research Agency (USAFHRA), K-WG-37 HI, document 1.
47. *The Air Force in Southeast Asia,* USAFHRA K168.01-43.
48. History, 37th Tactical Fighter Wing (TFW), January–March 1968, vol. 1, 17. In February 1968 the wing expanded to three squadrons with the arrival of the 355th Tactical Fighter Squadron.
49. The total number of pilots fluctuated—based on the daily flying schedule—over the three-year period and occasionally rose to as many as 22 or dropped to as low as 14. The schedule, in turn, depended on the number of F-100Fs available.
50. History, 37th TFW, July–September 1967, 416th Detachment 1 Operation Commando Sabre roster.
51. *The Air Force in Southeast Asia,* 173.
52. History, 37th TFW, July–September 1967, memo from Lt Col Donald Jones to Col Edwin Schneider. These limits would later be extended, as evidenced by Capt Dick Rutan being hit on his 104th mission after flying Misty from 30 January to 17 August 1968; History, Commando Sabre Operations, July–September 1968; and History, 37th TFW, July–September 1968, vol. 2, 93.
53. Dick Durant, "Dick Durant's Observations," in *Misty: First Person Stories of the F-100 Misty Fast FACs in the Vietnam War,* ed. Donald W. Shepperd (Austin, Tex.: Misty FAC Foundation, 2002), 246. The Misty upgrade program consisted of five missions in the backseat, followed by additional missions in the front seat with a Misty instructor-pilot in back. Checkout varied but, following the initial five backseat missions, pilots alternated between front and back seats for an additional 5–15 missions in training status until fully checked out.
54. History, 37th TFW, July–September 1967, 20.
55. *The Air Force in Southeast Asia,* 179.
56. Ibid.
57. History, 37th TFW, July–September 1967, 23.
58. Major Day would eventually receive the Medal of Honor for his evasion efforts and conduct as a prisoner of war.
59. *Summary of F-100 and F-4 Losses in the FAC/VR Role July 1967–July 1970*, USAFHRA K717-3912-3, 7.
60. Ibid., table D2.
61. Ibid., 7.
62. Ibid., table D2.
63. History, 37th TFW, January–March 1969, vol. 2, 21.
64. *The Air Force in Southeast Asia, 179.*
65. History, 37th TFW, July–September 1967, 25.
66. History, 37th TFW, October–December 1967, 15.
67. Schlight, 282.

68. Momyer, 319.
69. History, 37th TFW, January–March 1968, 21.
70. Ibid., 24–25.
71. History, 37th TFW, July–September 1968, 25.
72. History, 37th TFW, April–June 1968, 21.
73. *The Air Force in Southeast Asia,* 181.
74. Ibid., 182.
75. History, Commando Sabre Operations, July–September 1968, 40.
76. Ibid., 41.
77. History, Commando Sabre Operations, July–September 1968, 17.
78. Ibid., 8.
79. History, Commando Sabre Operations, October–December 1968, 11.
80. History, Commando Sabre Operations, January–March 1969, 10.
81. History, Commando Sabre Operations, April–June 1969, 16.
82. History, Commando Sabre Operations, January–March 1969, 21.
83. History, 37th TFW, April–June 1969, 15.
84. History, Commando Sabre Operations, July–September 1969, 7.
85. Ibid., 9.
86. Ibid., 5.
87. History, Commando Sabre Operations, October–December 1969, 9.
88. History, Commando Sabre Operations, January–March 1970, 8.
89. Ibid., 12.
90. History, Commando Sabre Operations, April–June 1970, 13.

Chapter 3

Misty-FAC Tactics: Hypothetical Mission

Misty FACs were born out of the necessity of combat. Facing a rising flow of supplies from North Vietnam to the Vietcong in the South and increasing surface-to-air threats, the USAF was forced to rethink its interdiction campaign. Politically restrained from air attacks on lucrative targets in the North, the US military was further restricted from inserting ground forces into North Vietnam. The United States was forced to rely on airborne FACs to interdict supplies in southern North Vietnam and along the Ho Chi Minh Trail in Laos. However, the slow-moving O-1 and O-2 FACs, initially well suited for reconnaissance operations north of the DMZ, found themselves highly vulnerable to Russian-supplied SA-2s and large-caliber antiaircraft guns.

USAF responded by introducing the Fast FAC, an elite mission for which only the most experienced pilots could volunteer. Two fighter pilots, with varying degrees of FAC training or experience, would strap themselves into an aging, two-seat F-100F and venture out singleship to the North to ferret out and control strikes on trucks, AAA sites, and SAMs. This chapter depicts a typical Misty mission and covers the essential mission elements of visual reconnaissance, strike control, and search and rescue (SAR) operations—all conducted under the relentless threat of deadly North Vietnamese gunners.[1]

The first Misty sortie of the day, Misty 11, is scheduled to arrive on station in RP I by dawn. Subsequent missions are scheduled throughout the day to maintain constant coverage until nightfall.[2] The pilots report to Misty operations two and one-half hours prior to takeoff. They must be briefed by intelligence on significant events, such as the loss of any aircraft or aircrews in a 24-hour period, updates to AAA locations, and any high-priority target photos, which may have arrived from Seventh Air Force headquarters overnight.[3]

Little ISR information is available from outside sources. Most information is derived from the mission reports of recent Misty sorties. A master map in the main briefing room maintains the most current enemy ground order of battle, including AAA sites and the locations of recently attacked targets.

The pilots review the relevant section of the air tasking order, referred to as the fragmentation order or "frag." This includes on-station times, air-refueling information, and other information pertinent to daily flight operations. They also review and update their detailed maps, extract coordinates for potential targets, and conduct a flight briefing. The rear seater, commonly known as the guy in back (GIB), also prepares the 35 mm high-speed camera for photoreconnaissance. When ready, the pilots proceed to life support where, in addition to donning their combat flight

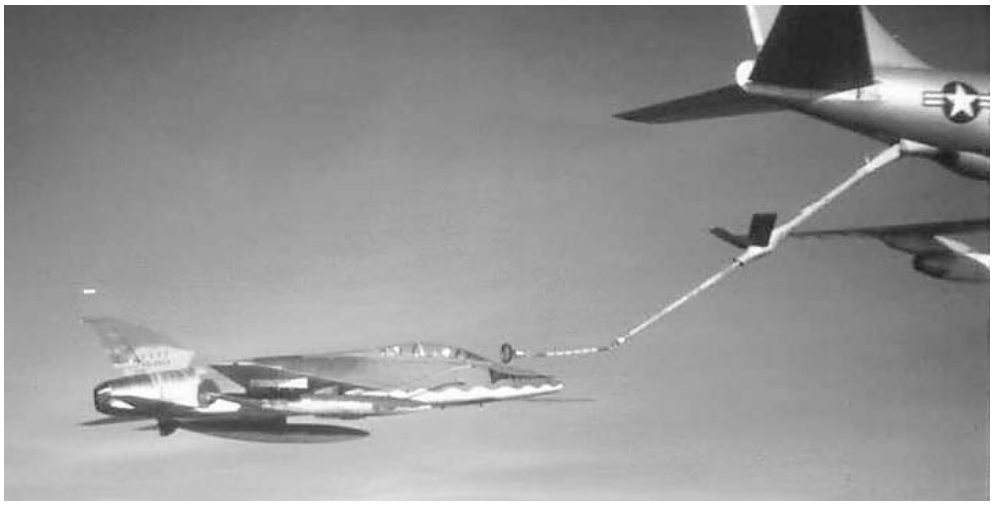
gear, they each pack an extra survival radio and bottles of frozen water.[4] The pilots step to the jet 45 minutes prior to takeoff and split the preflight duties to prepare the F-100F for flight.

F-100F and Misty-FAC Munitions Load

The F-100F Super Sabre, more affectionately known as the Hun, is a good choice for the Fast-FAC mission for several reasons. With its bubble canopy, the F-100F provides good front and rear cockpit visibility.[5] It can maintain both airspeed and maneuverability when carrying a light load. Such capabilities are critical for survival at low altitude in a high-threat environment. The Hun is simple, cheap, rugged, and able to take a hit without disintegrating or losing flight control.[6] In addition, experienced F-100 pilots are readily available from the four fighter wings in Southeast Asia tasked with "in country" (South Vietnam) CAS missions.[7]

F-100F with combat load (note the rocket pod on the outboard station and the external fuel tanks on the inboard station)

Though a good choice for Fast FACing, the Hun does have its weaknesses. Built in the late 1950s, the F-100 is old and was slated to leave the active Air Force inventory by 1970.[8] Also, relatively few two-seat F-100Fs are available in Vietnam and are assigned primarily to upgrading and training newly arrived F-100 pilots in-theater. High loss rates and frequent battle damage have begun to limit the availability of F-100F airframes and to plague Misty operations, which has proven to be the primary obstacle to expanding Misty coverage. The F-100 also has a large turn radius that demands the near-constant use of full throttle with occasional inputs of minimum afterburner to maintain sufficient airspeed for jinking. For self-protection, the F-100F does not yet have radar homing and warning gear and carries neither ECM pods nor chaff.[9] The Hun has no radar, only one ultrahigh frequency (UHF) radio, and no inertial navigational system. Its only navigational aid is a tactical air navigation (TACAN).[10] Finally, the F-100 refuels by probe and drogue, a method less widely used, while the more modern USAF fighters and bombers have transitioned to boom refueling.[11] Dedicated tankers are thus required to support Misty-FAC operations.



F-100F Probe and Drogue Refueling

Another detractor from the F-100 is the limited thrust from its single engine, which reduces the quantity of weapons that can be loaded for the low-altitude mission. An important part of Misty 11's preflight check ensures that the jet is loaded with the proper external configuration. FAC missions require a specialized munitions load that maximizes available fuel, minimizes drag, and allows for target marking. The standard load-out includes two LAU-59 rocket pods on the outer stations, each containing seven 2.75-inch folding-fin white phosphorous (Willy Pete) rockets.[12] These rockets are the primary means for Misty 11 to mark the target quickly and accurately for strike aircraft. Though Misty FACs fly primarily during the day, a limited number of night sorties are flown. On night missions, one or both of the rocket pods are swapped out for SUU-25 dispensers, which carry eight M-24 night illumination flares per pod.[13]

Two 355-gallon (gal) external drop tanks are loaded onto the inboard stations, thus adding an extra 5,000 pounds (lb) of fuel. The extra fuel extends on-station times for Misty FACs by as much as 20 to 30 minutes between refuelings. Internally, two M-39 20 mm cannons are loaded with 325 rounds of high explosive incendiary (HEI) ammunition.[14] The 20 mm gun has proven less effective than rockets in marking targets. It is more difficult for fighters to see the impacts of the 20 mm rounds and the limited tactical effective range of the gun—around 3,500 ft—leaves the Misty FAC more exposed to ground fire while strafing. Due to the extra risk, strafing is reserved for rescues and against high-value fleeting targets.

The inner two stations remain empty to keep the jet with less drag. Though ECM pods were initially tested on these stations, they proved ineffective and have been abandoned.[15] Misty FACs, like all fighter pilots, prefer more ordnance, greater thrust, and longer endurance. However, given the flight characteristics of the F-100F, the mix of rockets, bullets, and fuel prove more than adequate for the task at hand.

Flight Profile of Misty

After the preflight walk-around, the pilots climb into their jet, start the engine, complete the remaining checklist items and taxi to the runway. Upon takeoff, Misty 11 climbs to 20,000 ft and contacts Panama, the radar site at Da Nang providing radar vectors to RP I. When artillery is active along the DMZ or when the weather is poor in RP I, Misty can fly over the Gulf of Tonkin and let down through the weather on a TACAN radial over the water.[16] It takes about 30 minutes to reach RP I and, in the process, Misty 11 switches to Cricket (or Hillsboro), the airborne command and control center (ABCCC) in charge of RP I.[17] The flight receives an area update and begins a fuel conserving en route descent 40 miles prior to the target area. After completion of the descent check, the pilots arm the rocket and gun and begin the preplanned target search.[18]

During this first visual reconnaissance/strike control (VR/SC) period, Misty 11 evaluates the weather for visual flight operations, follows the preplanned VR route, conducts a search of potential target areas, and looks for any unusual signs that might indicate enemy activity. After 30 minutes of verifying targets and locating active areas, it is time for the first of two aerial refuelings. By climbing out over the Gulf to the Blue Anchor tanker track, Misty 11 recontacts Cricket and coordinates for the available fighters to strike the targets that have been located.[19] It takes about 25 minutes to reach the KC-135 tanker track, take on fuel, and return to RP I.[20] On this mission, only two refuelings are scheduled. If the next Misty FAC is unable to get airborne, however, or an aircraft is downed and SAR is required, as many as four or five refuelings may be necessary. Tankers have been known to disregard ROE and fly over the North Vietnam coastline to reach Misty FACs that are exceedingly low on fuel or to help a damaged bird leaking fuel to take on enough fuel to make an emergency landing at Da Nang.[21]

The second VR/SC period will entail directing strikes on targets found in the first VR/SC period. Misty 11 will have about one hour to work targets before returning to the tanker track to refuel for a third VR/SC period. This sortie is scheduled for a relatively short 4.0 hours with 2.0 hours spent in VR/SC. If fewer F-100Fs are available for the daily schedule or if a rescue is needed, the sortie length may increase six to eight hours. Table 1 provides the Misty mission profile for October 1968.

Threat Avoidance

The Misty-FAC mission has been created to conduct VR in high-threat areas where O-1 and O-2 FACs cannot survive. AAA has proven to be the greatest threat to all air operations in Vietnam.[22] The replacement of slow FACs with faster aircraft has not been sufficient to prevent experienced North Vietnamese gunners from claiming more kills. Still, there are four

Table 1

Misty Mission Profile, October 1968

Reference Time (T Hour)	—	Takeoff Time
T minus 2:00	—	Pre-mission Briefing
T	—	Takeoff
T – T+:30	—	En route to Operating Area
T+:30 – T+1:00	—	Visual Reconnaissance/Strike Control
T+1:00 – T+1:25	—	Refueling (9–10,000 lbs offload)
T+1:25 – T+2:25		Visual Reconnaissance/Strike Control
T+2:25 – T+2:50	—	Refueling (9–10,000 lbs offload)
T+2:50 – T+3:20	—	Visual Reconnaissance/Strike Control
T+3:20 – T+4:00	—	Return to Base
Total Area Time		2:00
Total Flight Time		4:00

techniques Misty 11 can use to minimize the surface-to-air threat. First, Misty 11 can avoid known AAA sites. As there is a direct correlation between the location of lucrative targets and the positioning of air defenses, however, Misty 11 will be forced to face active AAA. Second, they can stay above the range of AAA by flying at higher altitudes. Remaining above 4,500 ft avoids most small arms and light AAA engagement envelopes, but the larger AAA (23 mm, 37 mm, and 57 mm) can reach well above that level.[23]

These higher-altitude tactics are effective in the coastal plain of RP I, where targets are relatively in the open, as compared to the mountainous areas of western RP I and the triple-jungle canopy of Laos along the Ho Chi Minh Trail. Here, well-concealed and camouflaged vehicles are harder to identify and require low-altitude passes to confirm as targets. Although there are fewer AAA pieces larger than 23 mm, the Misty FACs operate below 1,000 ft, in the heart of small arms and light AAA envelopes.[24]

The third way to avoid AAA is to spoil the gunner's aiming solution. Since it takes between three to seven seconds for AAA bullets to travel to where the gunner is aiming—if the gunner does not lead the fighter sufficiently—the bullets will fly harmlessly behind the aircraft. Even if the gunner calculates the proper lead, if the aircraft adjusts its flight path during the bullet's three to seven seconds, the bullets will likewise miss. By taking advantage of this knowledge, Misty 11 flies a three-dimensional profile, constantly jinking to vary the flight path. To maintain a minimum of 400 knots indicated airspeed (KIAS), it is essential to prevent the jet from "wallowing" when Gs are applied. Misty 11 must smoothly adjust the angle of bank and altitude while maintaining a one and one-half to two Gs constant loading on the aircraft.[25] Above 10,000 ft, however, it is acceptable to reduce the bank angle and lighten the G load. Two hours of jinking is physically demanding on both pilots and is nauseating to the GIB, who is head down plotting targets.

The fourth way to avoid AAA is to minimize the number of passes within range of a gun and to fly an unpredictable flight path. Misty 11 must avoid orbiting around targets and, if a second pass is necessary for target identification, they must first exit the target area and return later for confirmation.

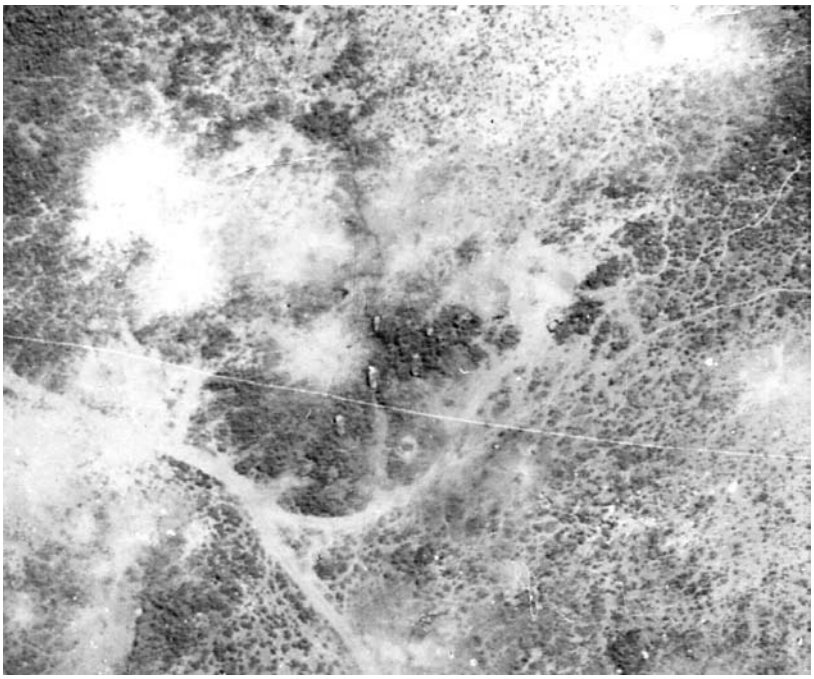
Visual Reconnaissance

Being able to survive is prerequisite to being able to strike targets. However, before a truck or AAA site can be destroyed, it first must be located. A good Misty FAC can consistently locate and identify valid targets, and he has three qualities. He should have recent and in-depth experience with the area of operations. It takes hour upon hour of close, daily observation to memorize distinct terrain features, LOCs, and active and inactive AAA sites.[26] Second, he should be able to note subtle changes that indicate enemy activity, while jinking at over 400 knots. It takes most Misty FACs 10 to 20 missions to develop such a high level of perception.[27]

Trucks in Route Package I during the Christmas 1967 Bombing Halt

Third, while a pilot may develop a sense for where to look for targets with time, a visual scan pattern is another necessary tool for target acquisition. An appropriate technique is described in the Commando Sabre Operating Instruction 55-1: Because the basic minimum of 400 KIAS and 4,500 ft altitude is closely observed, special visual techniques similar to reading printed matter are used. The eyes jump from point to point, locking on to and closely searching each point selected before jumping to the next. Select small areas because high aircraft velocity does not allow sufficient look time to search large areas. A point selected for search may be

observed from different angles as the aircraft passes over it. This allows observers to acquire targets by looking "into the trees" and to take advantage of any slanted light due to sun angle. Do not allow your eyes to drag along the ground; move them from point to point.[28]



Truck Park in Tree Line

This visual-scanning technique can be modified, depending on the type of targets being sought: road reconnaissance for trucks parked along the sides of roads differs greatly from scanning for AAA sites when preparing a survivor's position for rescue. For road reconnaissance, a series of unpredictable S turns is flown along the LOC. These 90° banked turns are conducted while varying altitude for full three-dimensional maneuvering. To effectively conduct road reconnaissance, the pilot must know the road well enough to anticipate abrupt turns and maneuver appropriately.[29] Figure 1 provides an example of a typical flight path for road recce. Once the Misty FAC locates the target, he continues on to avoid alerting the truck drivers that they have been detected. He may then return with fighters to strike the trucks later.[30]

Locating an occupied AAA site requires still a different technique. Hundreds of AAA sites, mostly empty, dot the RP I landscape (see map 4). The unoccupied sites are easily discernible, while the occupied sites are camouflaged and more difficult to locate. As one Misty FAC recalls: "There are hundreds of unoccupied gunsites around the area. They are the dish-shaped holes in the ground surrounded by dead vegetation, but who wants to find unoccupied gunsites? The occupied sites are the natural-looking

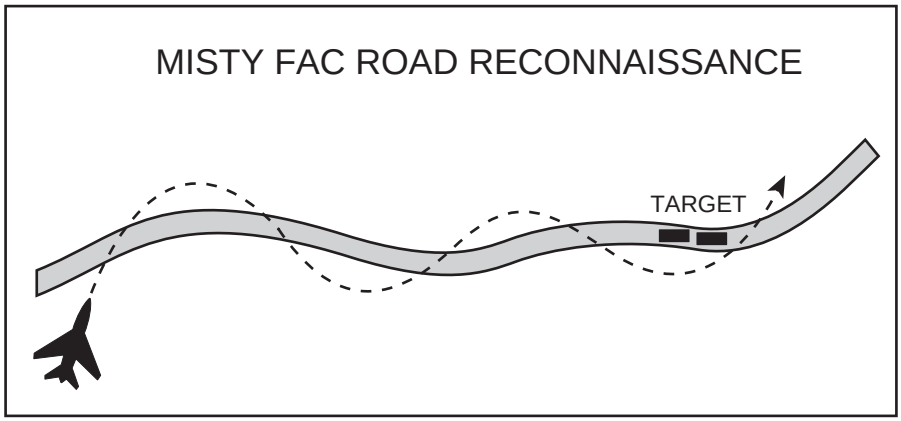


Figure 1. Road Reconnaissance

trees and shrubs within one mile of the unoccupied sites. Since the distance between unoccupied sites is usually less than one-quarter mile, you simply subtract the unoccupied sites from the area, and everything else is an occupied gunsite!"[31] As another Misty FAC expresses it, "I think it [is] rather like a country boy teaching a city boy how to spot a bullfrog, because once you get so that you can see an occupied AAA site and once you recognize it, it becomes very easy to locate them."[32] Just because a AAA site is occupied, however, does not mean it is active. North Vietnamese gunners have learned not to fire at Misty FACs unless they believe they can fire unobserved or if their site or the target they are tasked to protect comes under direct fire.[33] Although North Vietnamese gunners will think twice about shooting at a Misty, once a AAA site has fired and believes its position to be revealed, the site will relocate overnight. The lesson to be drawn from this is that, once a AAA site is located, it is best to leave it alone until it becomes active or another reason arises to attack it.[34] In the long run, it is better to know where the silent guns are than to drive them into hiding.

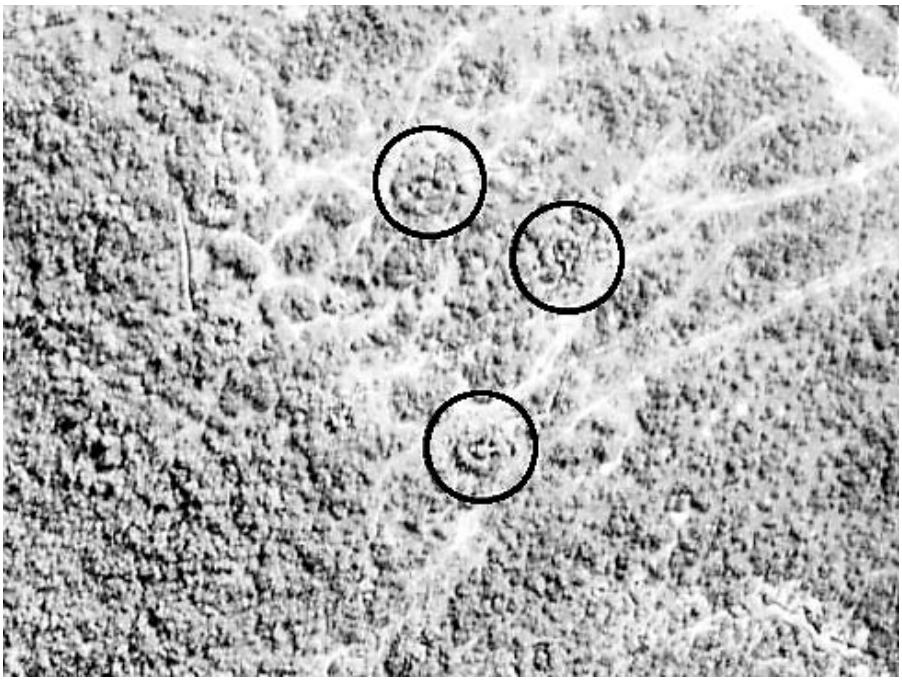
The final quality of a good Misty FAC has to do with a pilot's natural ability. Some FACs are simply better at finding targets than others. Misty FACs such as Keith Heineger and Charlie Summers are venerated for their ability to locate targets where mere mortals can see nothing more than a clump of trees.[35] While experience, coupled with a well-developed scan technique, will add to the number of targets a FAC can locate, it can never outdistance the fabled accomplishments of a blessed few. This innate ability, rather like the inexplicable prowess of a star athlete, is inherent in the true predator.

Strike Control

Early in the second VR/SC period, Misty 11 has identified two stationary trucks underneath a group of trees at a suspected truck park. Three occupied AAA sites are just south of the target, but none have been active

Map 4

Camouflaged AAA Site in Route Package I, 19 November 1967



yet. Cricket informs Misty 11 that Buick—a flight of four F-105 Thuds, which weather diverted from RP VI—are inbound and loaded with M117, 750 lb general-purpose bombs. The target area is 12 miles inland, and Misty 11 turns east to meet the Thuds off the coast. Buick checks in on the strike frequency, confirms that his flight is loaded with six bombs apiece, and continues toward the rendezvous point. Once visual, Buick will follow Misty 11 to the target area. As the front seater works the rejoin, the GIB begins the initial target briefing to the fighters, which describes the general target area and provides the location and status of AAA sites. Target weather and winds, elevation, a local altimeter setting, a safe bailout area, and recommended run-in headings are also included in the briefing.[36]

Upon approaching the target, Misty 11 begins the talk-on. If successful, it will get the eyes of Buick's flight lead on the target and will alleviate Misty 11 from having to mark the target with a rocket. This action is highly desirable because the gunners often do not react until the target is marked. However, even if Buick does not have the exact target location in sight, a general area talk-on will have the fighters to look in the right direction when the rocket pass is made.

Misty 11 first establishes a cardinal direction by referring to a prominent road running through the area and labeling it "north-south." Even though the road does not run exactly north to south, all further directions are aligned with this new reference (fig. 2). The talk-on begins from a

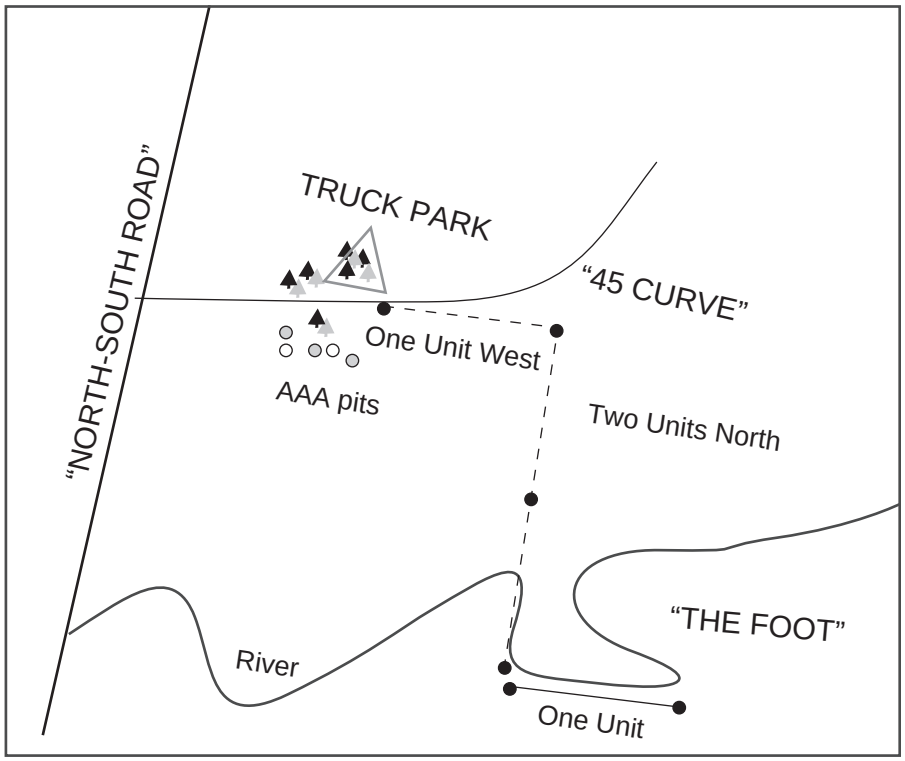


Figure 2. Truck Park Talk-On

prominent, easily identifiable point. Misty 11 points out a bend in a river three miles south of the target, calling it "the foot" because of its shape. When selecting the foot, Misty makes sure there are no other bends in the river that Buick might misidentify. Once Buick confirms that he is visual with the foot, Misty establishes a unit of measure, with the length of the foot east to west being equal to one unit. Misty then directs Buick to start at the heel of the foot and to look two units north to where a small east-west dirt road makes a 45° turn to the northeast. Misty calls this the "45 curve" but does not continue the talk-on until Buick confirms he has the 45 curve in sight.

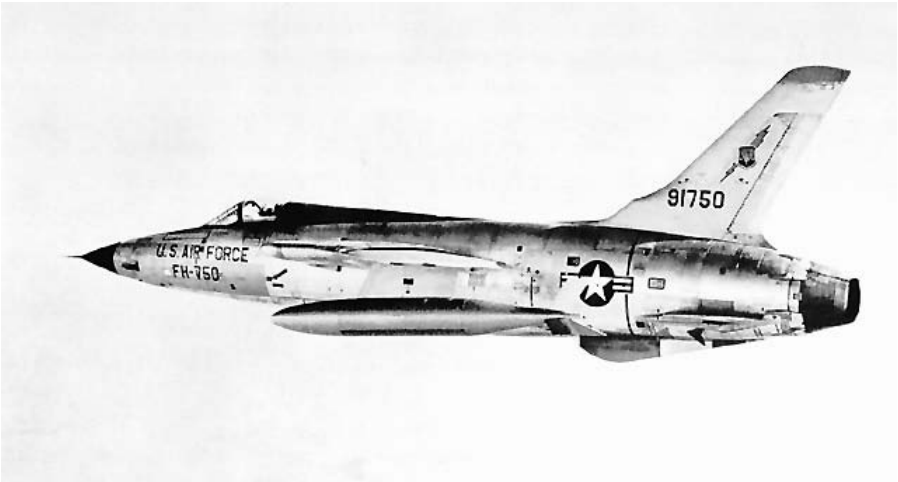
The truck park is approximately one unit west of the 45 curve and 50 meters north of the road. Though Buick has his eyes in the area, there are several stands of trees, and he cannot be sure he has the correct one in sight. Misty 11 will have to mark this target with a Willy Pete rocket. Even though the F-100F has no computed weapons delivery system, rockets can be delivered accurately at slant ranges of up to two miles. Given the winds, Misty 11 quickly computes the appropriate mil depression for a 45° dive and adjusts the sight. Release altitude is calculated to recover above 4,500 ft. Misty 11 uses a curvilinear approach to minimize time spent in a straight and predictable flight path. He rolls out wings-level at release altitude and fires the rocket slightly upwind. Upon impact, the light surface wind blows the blossoming white phosphorous cloud directly over

the trucks. Misty 11 immediately begins the recovery, rolling into 30° of right bank and pulling four and one-half Gs. As the jet's nose approaches the horizon, a left rudder roll is initiated to allow the now-inverted pilots to view the impact of the rocket through the top of the canopy. When they pass 30° nose high, the Gs are relaxed as Misty 11 coasts up to 10,000 ft to observe Buick's attack.[37] This is a good mark, and the smoke completely engulfs the truck park, thus allowing Misty 11 to make the radio call that FACs find most gratifying: "Hit my smoke!"

Buick 01 calls "smoke in sight" and rolls in from the east. As Misty 11 holds above the fighters, small puffs of white cloud appear above Buick 01 as he pulls off target. Misty notes the telltale smoke drifting out of one of the gun pits and identifies the rounds as 37 mm.[38] Buick 01's bombs hit 50 meters west of the trucks. Buick 02 and 03 correct off 01's bombs and lays their stick of bombs across the clump of trees.[39] A small cloud of black smoke wafts up through the trees, betraying an enemy truck now on fire. Buick 04 releases on the active gun site, and the flight departs to the west. Buick has dropped good bombs, and the entire attack has taken less than 10 minutes. Misty 11 provides BDA to the fighters as 75 percent of ordnance on target and 100 percent within 50 meters. Once the target area has cooled down, Misty will return for a better damage assessment and perhaps get a good photograph.

Twenty minutes later, Misty 11 performs a low-altitude pass over the site. While one of the trucks is smoldering, they note that the AAA site is still active. Targets such as AAA guns, made from hardened steel and protected by earthen berms, are difficult to kill. Though F-105 pilots are typically good bombers, their inability to get direct hits on target not only reduces the damage done but also increases the number of sorties required per kill.[40]

The diverse nature of the munitions the fighters carry only adds to the complexity of killing targets. While 500–2,000 lb general-purpose bombs are good weapons for a variety of targets, cluster bomb units (CBU)-2 are sensi-



F-105 Thud

tive to release altitude. Released too high, CBU produces a donut-shaped pattern around the target; but if released too low, the container does not open.[41] Other munitions include rockets and the 20 mm gun. Though accurate, they lack the hard-kill capability needed against AAA pieces.[42]

Search and Rescue

Following the second-scheduled refueling, Misty 11 begins a descent back towards RP I. The unmistakable "chirp, chirp, chirp" of a bailout beacon cuts through the airwaves over Guard.[43] Misty 11 immediately turns the radio to direction-finding (DF) mode and gets an initial heading for the downed aircrew's location. Next to contact is Crown, the SAR ABCCC. Misty radios them on the SAR common frequency, finds out the downed aircrew's call sign, and begins to coordinate for the rescue effort. The large number of aircraft shot down in RP I has made SAR operations a common occurrence, but the crew's adrenaline level is up.

Crown confirms that an F-4, call sign Lion 32, has been shot down near the coast in the northern section of RP I. The remaining three aircraft are currently CAP-ing the survivors' location. Lion 31 informs Misty that his wingman was hit by AAA over a target 15 miles west of their current location. Lion 32 climbs out to the east, hoping to make it feet wet, but is forced to eject just prior to reaching the coast.[44] Lion 31 has a visual on both parachutes, which have settled about 200 meters apart two miles inland. The fact that the F-4 was able to depart the target area and that the aircrew has landed fairly close to the shore bodes well for the rescue attempt. Misty follows the coast until the three circling F-4s are visible. Lion 31 is able to talk Misty 11 onto the survivors' location before departing for the tanker. Crown now designates Misty 11 as the on-scene commander.

Misty 11 watches as one of the survivors gathers up his parachute. Guard frequency goes quiet as they disconnect their parachute beacons, one by one. Lion 32A (the front seater) is the first to come up on frequency. He reports that he is in good condition, is not visual with Lion 32B, and will be taking cover in a thicket 40 meters west of where he has landed. He also reports that he took some small-arms fire while descending in his parachute but is unhurt and has not seen any activity since landing. Crown passes a question from Lion 32A's personal survival information, something only he would know and remember even under duress. All aircrew must review their survival information before each mission. Misty 11 authenticates Lion 32A by asking him the question and forwards the answer to Crown for confirmation.

Misty 11 begins searching the area for AAA sites that will have to be suppressed before the rescue can take place. They update Crown on the status of the survivors and are informed that four A-1 Sandys have been launched and two sets of fighters have been diverted for the rescue effort.

A-1H/J Sandy Sitting Alert (note the CBU canisters and fuze extenders or daisy cutters on the parent-mounted Mk-82s)

The A-1 Sandy's job is to prepare the survivors and to secure their location for the arrival of the rescue helicopters. Misty FACs working RP I can usually get to a bailout site before Sandys on ground alert can arrive on scene. Mistys can also help speed up the rescue by locating the survivors and then suppressing AAA in the area to help the Sandys work in close. The Sandys will further suppress any immediate threat to the survivors.[45] Misty is concerned not only with AAA at the rescue site but also any along the egress route for the Sandys and the HH-3 Jolly Green rescue helicopters. After several low-altitude passes, Misty 11 has located all the occupied AAA sites and begins working fighters onto those positions.

Misty 11 is encouraged to learn from Crown that Misty 21 is en route. Misty 11 has just enough fuel to bring Misty 21 on board, show him the survivors' location, and brief him on the status of remaining AAA. By this time the second survivor, Lion 12B, is up on frequency. He reports that he is immobile and has broken a leg on landing. Misty 11 authenticates Lion 12B before handing over on-scene command to Misty 21 and heads for the tanker.

By the time Misty 11 returns, the SAR has progressed nicely. Misty 21 has continued strikes on all known AAA sites, and the Sandys have arrived. Sandy takes over on-scene command and begins a series of low-altitude passes in an attempt to draw ground fire and determine the threat level. As Sandy prepares the survivors for pickup, Misty 11 holds high above the scene as backup for Misty 21 in case 21 calls bingo.[46]

Sandy's lead is satisfied with the conditions and calls for Jolly. Two HH-3 helicopters have been holding feet wet and now proceeds to the survivors' location. Sandy gives the helicopters vectors inbound and calls for Lion

12A and B to pop their flares. The first Jolly quickly picks up Lion 12A, and the second HH-3 is forced to hover over the thicket where the survivor is lying as a PJ (enlisted pararescue specialist) descends on a hoist. The second pickup takes more than three minutes, and the crew reports it is taking small-arms fire from the south. The Sandys quickly descend to strafe North Vietnamese troops 100 meters south of the rescue scene. Finally, with Lion 12B and the PJ back on board, Jolly two turns east, escorted by the Sandys until it is feet wet. Misty 11 is now free to head home. Of all missions, none is as rewarding as a successful rescue.

HH-3 Jolly Green Helicopter

Return to Base

Misty 11 lands at Phu Cat six and one-half hours after departure. Physically and mentally exhausted, the mission is still not over until the debriefing is complete. Misty-FAC debriefings actually generate the enemy order of battle for RP I as little intelligence arrives from Seventh Air Force in a timely fashion. Misty 11 debriefs intel on the master map by indicating new AAA sites as well as the BDA on targets struck. The two pilots spend the next few hours helping to prepare for the next day, then grab a quick steak before heading to the Misty bar. Here they reenact the day's events for other Misty FACs over a mug or two of liquid refreshment before grabbing some sleep for the next day's mission.

Effectiveness of Misty

Simply counting the number of strikes controlled or vehicles destroyed by Misty FACs does not adequately measure the effectiveness of Misty. The primary objective for Commando Sabre was the interdiction of North

Vietnamese supplies. Clearly, the overall interdiction campaign failed in cutting off support to the Vietcong, as well as in preventing the buildup required for the Tet offensive. Misty-FAC effectiveness was limited by both contextual and operational elements that combined to prevent a more successful interdiction campaign.

Bad weather and the cover of darkness proved to be significant contextual variables in hampering Misty-FAC operations. The F-100F lacked all-weather capability, which ruled out a continuous presence. Misty FACs shut down the Ho Chi Minh Trail on good weather days, which forced the North Vietnamese off the roads. Though Misty FACs experimented with night operations, even using a primitive night-vision device, the fact that strikers could not hit the targets that the Misty FACs located caused the night program to be discontinued.[47] The lack of 24/7 coverage allowed the North Vietnamese to adjust their operations by moving only under the cover of darkness or low ceilings. Through a series of well-concealed supply stations, the supplies slowly made their way down the trail. Misty FACs could decrease the efficiency of the North Vietnamese supply system, but they could not prevent supplies from reaching the Vietcong.

The ROE handed down by the White House stand out as the greatest contextual limitation to interdiction operations. Bombing halts and pauses gave the North Vietnamese time to replenish supplies and adjust defenses. For example, Russian tankers unloading fuel at Haiphong Harbor were declared off limits to attack. This limitation forced the more inefficient strafing of individual 50 gal oil drums as they were then floated down river. Restrictions prevented the insertion of US ground forces to cut the LOCs in southern North Vietnam and Laos. Further ROE implemented by Seventh Air Force early in 1970 ruled out low-altitude reconnaissance and strafing. While implemented to prevent Misty FACs from operating at treetop level, the restrictions resulted in fewer targets being located and destroyed.

Unguided weapons presented an operational limitation to strikers trying to destroy the small, hard targets that the Misty FACs located. Misty FACs seldom suffered from lack of targets but were invariably short of both the quantity and quality of fighters needed to destroy them. Even with these limitations, Misty FACing was still a more efficient method of interdiction than the previous method of diverting fighters to perform armed reconnaissance in RP I. When conditions were favorable, Misty FACs severed the flow of supplies along the Ho Chi Minh Trail.

Conclusion

In RP I and southern Laos, USAF attacked North Vietnamese forces without the benefit of friendly ground troops to locate, identify, and target the enemy. This mission proved to be one of the most difficult and dangerous of the war. The sense of accomplishment and esprit de corps shared by the small, elite Misty-FAC unit contrasts starkly with the general frustration

of the USAF experience in Vietnam. Other F-100 pilots, discouraged by the futility of bombing an unseen enemy, were recruited by Misty FACs with the promise that Misty missions made a difference. They were told they would see more action in a single sortie as a Misty FAC than they would in an entire tour of CAS missions in South Vietnam. Those who joined for this reason were not disappointed. Misty FACs detected the enemy where others could not. Although the unguided bombs of US fighters lacked the precision to consistently destroy hardened targets, they were effective against soft-skinned vehicles in the open. When Misty FACs were airborne, the movement of supplies to the Vietcong ground to a halt. The overall interdiction campaign—although plagued by political restrictions and the lack of 24/7 coverage—was ultimately a failure, one cannot deny the success of Misty-FAC daylight tactics.

Notes

1. The mission described in this chapter did not actually take place. Rather, it is a hypothetical mission, which incorporates mission elements from actual Misty missions. The F-105 air strikes and F-4 search and rescue mission depicted here are representative of actual missions.

2. The ability to provide constant coverage varied and depended on the number of F-100Fs available to fly. The bombing halt of North Vietnam in November 1968 saw Misty FACs transitioning to operations in Laos.

3. Ray Bevivino, "The Start of Misty Intel," in *Misty: First Person Stories of the F-100 Misty Fast FACs in the Vietnam War,* ed. Donald W. Shepperd (Austin, Tex.: Misty FAC Foundation, 2002), 43.

4. Ibid., ix. Of the 155 Misty pilots, 42 were shot down over Vietnam or Laos, for an overall shootdown rate of 27.7 percent. Thirty-four were shot down flying Misty missions, eight others were shot down flying other F-100 missions or other aircraft on subsequent tours.

5. Message, Commando Sabre, 31 July 1967, Supporting Documents for the CHECO Study: *Strike Control and Reconnaissance (SCAR) in SEA, 1965–1968*, 1962–1968 v2. The initial Fast-FAC concept called for a qualified FAC to perform duties in the backseat of a two-seat fighter.

6. Mentioned by numerous former Misty FACs in Misty FAC questionnaire, January 2002.

7. History, Commando Sabre Operations, 37th Tactical Fighter Wing (TFW), July–September 1968, 7.

8. USAF Museum Web site, http://www.wpafb.af.mil/museum/research/fighter/f100f.htm, n.p., on-line, Internet, 28 November 2001.

9. F-100s eventually did receive radar homing and warning gear; however, operations had already shifted to Laos where there were no radar-guided air defenses.

10. Tactical aid to navigation is a ground station that transmits both range and bearing information.

11. William Douglas, "Misty Experience: The Beginning," in *Misty,* 35.

12. History, Commando Sabre Operations, 14.

13. *Weapons File 1999* (Eglin AFB, Fla.: Armament Product Group Manager, January 1999), 10–25.

14. History, Commando Sabre Operations, January–March 1969, vol. 4, 11.

15. William Mayberry, "Stories by Bill Mayberry, Misty 5," in *Misty*, 52. Two electronic countermeasure pods were required, but when placed on the available inboard stations they tended to highlight rather than jam enemy radars.

16. History, Commando Sabre Operations, January–March 1970, vol. 1, 3-3.

17. Donald Jones, "A Trip into North Vietnam," in *Misty,* 156.

18. History, Commando Sabre Operations, January–March 1970.

19. Donald W. Shepperd, ed., Preface in *Misty,* viii. For missions over Laos, tanker tracks are located in Thailand.

20. "Mission Profile," in History, Commando Sabre Operation, October–December 1968, atch. 4.

21. Ibid.; and P. K. Robinson, "Panda Rescue," in *Misty,* 202.

22. Of the 34 Misty aircraft shot down, all were hit by antiaircraft artillery or small arms.

23. History, Commando Sabre Operation, January–March 1970, 12. After the loss of two aircraft in January 1970, Seventh Air Force restricted Misty FACs to above 4,500 feet, which underscored the importance placed on remaining above the threat.

24. Misty-FAC questionnaire, January 2002.

25. History, Commando Sabre Operation, October–December 1968, 3-1.

26. In fact, when Misty FAC operations were shifted from RP I to Laos with the November 1968 bombing halt, it took until January of 1969 for Misty FACs to become sufficiently familiar with the area to regain previous strike levels. History, Commando Sabre Operation, January–April 1969, 37.

27. History, Commando Sabre Operations, January–March 1970, vol. 1, 4-2.

28. Ibid.

29. Misty-FAC questionnaire, January 2002.

30. This figure is deceptive since it appears the trucks are traveling along the trail. This rarely occurred during the day; rather, trucks were parked and hidden alongside the road.

31. Jones in *Misty,* 159–60.

32. Charles Neel, USAF Oral History Program, interview #493, 2 December 1971, 10.

33. Ibid.

34. Ibid., 12. One valid reason to attack might be to clear a corridor for an HH-3 Jolly Green helicopter during a rescue mission.

35. Bob Blocher, "Misty Quickies," and Lanny Lancaster, "From My Records," in *Misty,* 66 and 191.

36. History, Commando Sabre Operations, October–December 1968, 4-1.

37. History, Commando Sabre Operations, January–March 1970, vol. 1, 5-3.

38. Merrill A. McPeak, "Gutsy Gunner," in *Misty,* 304.

39. Bombs laid down in a linear pattern with a prescribed distance between each bomb are called a stick.

40. Neel, 41.

41. Chuck Turner, "Starting Up," in *Misty,* 61.

42. Neel, 16.

43. P. K. Robinson, "The Birth of Night Misty," in *Misty,* 200. Guard is the ultrahigh frequency emergency frequency 243.0.

44. The chances for successful rescue over water are much greater than those over land. The North Vietnamese must launch Sampans (small boats) to reach a downed pilot. Sampans are fairly easy to spot and attack from the air, which makes it easier to secure the location until the helicopters arrive. The threat level for the rescue forces is likewise lower.

45. History, Commando Sabre Operations, January–March 1970, 5-3.

46. *Bingo* is a codeword for low fuel. Calling bingo indicates Misty 21 will have to proceed to the tanker.

47. Chris Kellum, "Misty at Night," in *Misty,* 271.

Chapter 4

History of Attacking Fielded Forces: Post-Vietnam to Kosovo

From World War I to Vietnam, the definition of interdiction remained consistent. Based on Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine,* September 1997, the definition of the term *interdiction* involved the destruction, disruption, diversion, or delaying of an enemy's surface military potential before it could be employed effectively against friendly forces.[1] While the 1997 edition is the latest version of *Air Force Basic Doctrine* as of this writing, an amended definition of AI has evolved in USAF due to the combat experience of Operation Allied Force over Kosovo in 1999. The latest edition of AFDD 2-1.3, *Counterland*, 27 August 1999, expands the scope of AI to include both lethal and nonlethal systems and is employed "to delay, divert, disrupt, or destroy the enemy's military potential before it can be brought to bear effectively against friendly forces . . . [or otherwise achieve its objectives]."[2] The phrase "or otherwise achieve its objectives" acknowledges that airpower, as demonstrated over Kosovo, can be used to attack an army directly without the presence or foreseeable presence of friendly ground forces. While the aerial attack of enemy ground forces is an old concept, the possibility of airpower to achieve military objectives in lieu of ground action is a new and highly controversial idea. A brief history is also provided of A-10 operations in Allied Force.

Immediately following the Korean War, many of the lessons learned about AI in Vietnam were lost, including the evolution of the Fast-FAC mission as performed by the Misty FACs. The focus of the US military turned once again toward Europe and the threat of invasion by the Soviet Union. During the late 1970s and 1980s, the US Army and Air Force worked to develop systems such as the Apache, air tactical missile systems, the A-10, and JSTARS in preparation to defeat the Red Army. AirLand Battle doctrine provided the joint vision for integrating air and land operations. AI was an essential element of AirLand Battle and a new term, *battlefield air interdiction,* emerged to emphasize the interdiction of second-echelon ground forces moving towards but not yet engaged with friendly ground forces.[3] The high-threat environment of Central Europe and the plethora of targets that would arise from a massive land battle limited the potential effectiveness of Fast FACs. The detection of rear-echelon forces would be the responsibility of such systems as JSTARS—not a difficult task, considering the wave of Soviet armor anticipated thundering down the Fulda Gap. North Atlantic Treaty Organization (NATO) aircrews studied X-ray, Yankee, and Zulu folders containing imagery and maps of the routes the Red Army would need to use.[4]

They likewise flew missions along the East German border and became familiar with the terrain over which they would have to fight.

The fall of the Berlin Wall in November 1989 and the end of the Cold War left the United States victorious but lacking a Soviet threat on which to base its military force structure and AirLand Battle doctrine. As the United States began to dismantle its forces in Europe, the focus shifted abruptly to the Middle East and the August 1990 Iraqi invasion of Kuwait.

Attacking the Republican Guard

On 17 January 1991, US and coalition forces launched the Gulf War air offensive. Waves of aircraft flooded into Kuwait and Iraq and attacked key integrated air defense system (IADS) nodes; airfields; command and control (C^2) systems; nuclear, biological, and chemical (NBC) sites; and electric plants.[5] Daybreak of day one witnessed the commencement of attacks against Iraqi ground forces in Kuwait. Among the centers of gravity identified by Gen H. Norman Schwarzkopf, the US joint force commander, were the seven elite Republican Guard divisions held in reserve along the Iraq-Kuwait border.[6] While aerial attack continued against key strategic targets in Iraq, 75 percent of strike missions focused on the Iraqi ground forces in Kuwait.[7]

The US casualty rate for the US ground invasion was predicted to be as high as 15,000.[8] Concern over this possibility prompted General Schwarzkopf to develop a strategy emphasizing the use of airpower prior to a ground battle in order to reduce significantly the size of the Iraqi army, its capability to maneuver, and its will to fight. This air-first strategy proved highly successful, with friendly casualty rates below even the most optimistic estimates. Friendly ground forces achieved objectives ahead of schedule and against only limited Iraqi resistance. However, this aerial achievement was not accomplished without major modifications to existing tactics.

The Persian Gulf War air offensive consisted of three phases, conducted nearly simultaneously. Phases one and two were directed against strategic and air-superiority target sets including leadership, C^2 facilities, NBC facilities, airfields, aircraft, and the IADS. Phase three laid out the air attack against Iraqi-fielded forces. It called for the 50 percent attrition of Iraq's 5,000 pieces of dug-in armor and artillery prior to any ground offensive.[9] In this phase, Schwarzkopf was most concerned with the three heavy divisions of the seven Republican Guard divisions along the Kuwait-Iraq border.[10] These units were widely dispersed and well dug in with thousands of earthen berms protecting their T-72 tanks.[11] Their defenses included AAA, infrared (IR) SA-13 SAMs, and radar-guided SA-6 SAMs.

Phase three required the unprecedented success of airpower against a fielded army.[12] Air planning chief Brig Gen Buster C. Glosson's briefing to Schwarzkopf in December 1990 estimated the Republican Guard could be attrited to 50 percent in only five days, assuming 600 sorties a day.[13] Air planners divided Kuwait and Iraq into a grid pattern of 30 nautical mile

(NM) x 30 NM squares known as killboxes. Strike aircraft were assigned individual killboxes for armed reconnaissance in locating and destroying Iraqi forces.[14] The task of attacking the elite Republican Guard fell to F-16s and B-52s, while A-10s were employed against the regular Iraqi divisions along the Kuwait-Saudi border.[15]

By the fifth day of phase three, coalition air attacks against the Republican Guard had not achieved anywhere near the 50 percent attrition level expected by Schwarzkopf.[16] Postwar analysis indicated that only 24–34 percent of Republican Guard heavy division armor was actually attrited during the entire 38 days of the air campaign.[17] Glosson's five-day estimate proved overly optimistic for two reasons. First, the number of sorties flown against the Republican Guard fell well short of 600 per day. A combination of initial emphasis on phase one strategic operations, a reluctance to employ A-10s against positions protected by SA-6 SAMs, and unanticipated Scud-hunting missions reduced the number of sorties available to attack the Republican Guard. For the first five days, total strikes against Republican Guard units were constant at around 100 missions per day. By the end of day 10, a cumulative count of sorties against the Republican Guard totaled 728 missions.[18] Second, air attacks were not as effective as war-gaming analysis had predicted.[19] US air forces used medium-altitude tactics to reduce the threat from Iraqi air defenses. While this greatly improved survivability, US pilots were relatively unfamiliar with medium-altitude tactics. Unforeseen difficulties with target identification, poor weather, and inaccuracies in delivering medium-altitude munitions combined to reduce effectiveness.

Increasing the number of sorties against the Republican Guard solved the first issue. However, the tactical problem of how best to destroy a dug-in army remained. In response, the joint air operations center incorporated three changes to improve the efficiency of the operational air forces. The first tactic involved directing the unique firepower of the A-10 against exposed and vulnerable Republican Guard forces. On 27 February, Glosson instructed A-10 commanders to prepare an attack on the Republican Guard Tawakalna armored division.[20] Facing such a heavily defended force, A-10s flew 48 aircraft in six waves of eight-ship formations, instead of their usual two-ship tactics. Three days of such wing-sized attacks were mounted against the division. The Iraqis responded by stepping-up their deception efforts and by digging their forces deeper into the desert sand. Though US Army damage assessment was unable to determine the extent of the damage to the Tawakalna division, the lowered threat from the division's air defenses and the increased use of decoys were considered positive indicators.[21]

The second innovation was the introduction of "tank plinking." Targets were located from medium altitude with IR targeting pods and then attacked with laser-guided bombs (LGB).[22] One of the greatest advantages of this method lay in the targeting pod video, which could clearly indicate the IR contrast of Iraqi armor against the cold desert background.[23] This method added to the ability to verify attacks and boosted BDA estimates.

The final tactical innovation introduced the "Killer Scouts." A squadron of OA-10 (observation/attack) FACs, A-10 aircraft manned single-ship armed reconnaissance and strike control missions in killboxes in southern Kuwait. Due to the perceived threat from radar SAMs, however, no OA-10s were directed deep against the Republican Guard. Instead, F-16CG (Block 40s) from Hill AFB, Utah, began flying as Killer Scouts.[24] This mirrored the Misty-FAC hunter-killer tactics of Vietnam and was renamed to avoid confusion with hunter-killer SEAD tactics being used by F-4G Wild Weasels and F-16s at the time. Killer Scouts would take off early and reconnoiter their assigned killboxes. Upon identifying Iraqi positions, they would bring in F-16 strikers for the attack. Like the Misty FACs, the Killer Scouts carried a minimum munitions load to maximize endurance and were allocated sufficient air-refueling tankers to remain on station for much longer periods of time. This allowed them to become familiar with the territory and increased their situational awareness.

Along with identifying viable target areas for attack, they also assisted in the collection of BDA. The Killer Scouts relied on their own eyes and were aided somewhat by binoculars for damage assessment. As with Vietnam, the F-16 strikers available to the Killer Scouts dropped unguided bombs from medium altitude. At medium altitude it was difficult to evaluate accurately the number of targets destroyed. While the Killer-Scout role had its limitations, this innovation did allow F-16s to more efficiently apply their resources against Iraqi fielded forces.

Following the Gulf War, the USAF remained deployed in the Middle East, maintained no-fly zones over Iraq, and responded to sporadic infringements by Saddam Hussein's remaining forces. Elsewhere, the dissolution of Yugoslavia and the ethnic cleansing of Muslims by Bosnian Serbs in April 1992 led to US military involvement with the United Nations (UN) peace-keeping force in Bosnia. Meanwhile, famine in war-torn Somalia brought a US military presence to Mogadishu in December 1992 until the hasty withdrawal of US troops in May 1994. In September 1995, US airpower was again needed, this time in Operation Deliberate Force, an 11-day air campaign which included attacks on Bosnian Serb fielded forces to bring Serbia to accept the Dayton Peace Accords.[25] By the late 1990s the United States and the rest of NATO were convinced of the effectiveness of air-power in coercing Serbian president Slobodan Milosevic. They believed a similar tactic might be needed to solve the growing unrest in Kosovo.

Kosovo: Direct Attack of the Serbian Third Army

Tensions between Belgrade and Kosovo increased during the late 1980s. Milosevic used protests by minority Serbs residing in the majority-Albanian province as the foundation for his Serbian nationalist platform and his subsequent rise to the Serbian presidency in 1987.[26] By 1989, Belgrade had revoked Kosovo's status as an autonomous region and had also placed

restrictions on land ownership and government jobs for Kosovar Albanians.[27] During the 1990s, Kosovar dissension spawned a series of both violent and nonviolent protests.[28] Opposition rose in 1997 with the formation of a small group of lightly armed guerilla fighters known as the Kosovo Liberation Army (KLA). In response to KLA ambushes of Serbian police in early 1998, Serbian forces conducted brutal retaliatory attacks against suspected KLA positions.[29] KLA support swelled within Kosovo and led to an escalation of KLA activity. In July 1998, Serbian forces conducted a village-by-village search for KLA members, which displaced more than 200,000 Kosovars in the process.[30] The magnitude of the humanitarian crisis captured the attention of the international community.

In response to the KLA and Serbian exchanges, the UN Security Council passed Resolution 1160 in March and Resolution 1199 in September 1998. The resolutions condemned Serbia's excessive use of force, established an arms embargo, and called for an immediate cease-fire and the introduction of international monitors.[31] The latter demand was met in the cease-fire negotiated between US envoys and Belgrade in October.[32]

However, the massacre of 45 Kosovar Albanians at Racak on 19 January 1999 quickly brought the cease-fire to an end.[33] Under threat of NATO air strikes, Serbian and Kosovar representatives were summoned to Rambouillet, France, to negotiate a peace agreement.[34] The compromise included the key items of a NATO-led implementation force, the recognition of the international borders of the Former Republic of Yugoslavia (comprised of Serbia, Montenegro, and Kosovo—see map 5), and an interim three-year agreement, after which a final settlement of Kosovo could be arranged.[35] The Kosovar delegation initially refused to agree unless reference was made to a future referendum to decide the fate of Kosovo. Under the threat of the withdrawal of international support, including financial and military aid to the KLA, they reluctantly signed on 18 March 1999.[36] The Serbs, unwilling to accept a NATO-led military force within Kosovo, remained recalcitrant. In the face of diplomatic impasse, NATO air strikes were ordered to commence on 24 March.

Initial planning for NATO air strikes against Serbia began as early as June 1998.[37] Targeting for the strikes focused on fixed C^2 and military facilities in Kosovo, Montenegro, and Serbia. These targets were selected for a variety of reasons, foremost being the low risk of collateral damage.[38] The strikes were intended as the punishment portion of NATO's coercive carrot-and-stick strategy. The initial target list included only 100 targets.[39] Of these, only 50 were eventually approved by the North Atlantic Council, sufficient for only two or three nights of strikes.[40] Hence, the constrained nature of the strikes reflected the overarching concern for maintaining consensus among the 19 NATO countries.

In February 1999, in the midst of the Rambouillet talks, Gen Wesley Clark, supreme allied commander, Europe, became concerned about the prospect of increased ethnic-cleansing operations by the Serbian army within Kosovo once NATO air operations commenced. Two of NATO's stated military objec-

Map 5

Serbia, Kosovo, and Montenegro

Source: Available from http://www.lib.utexas.edu/maps/europe/serbia_montenegro_pol_97.jpg.

tives involved dealing directly with the Serbian fielded forces: to deter further Serbian action against the Kosovars and to reduce the ability of the Serbian military to continue offensive operations against them.[41] General Clark ordered his combined forces air component commander, Lt Gen Michael C. "Mike" Short, to increase the scope of air planning to include direct attacks on the Serbian fielded forces in Kosovo. This planning did not include the insertion of US ground troops, commensurate with President William "Bill" Clinton's public announcement that no US troops would enter Kosovo until after a settlement was reached.

With the breakdown of the Rambouillet peace talks and subsequent withdrawal of international observers on 19 March 1999, Serbian ground forces commenced the systematic expulsion of Kosovar Albanians from Kosovo, code-named Operation Horseshoe.[42] Ethnic-cleansing operations were stepped-up once NATO began bombing, which caused several hundred

thousand refugees to seek safety in Albania and Macedonia or to flee to the foothills within Kosovo as internal refugees (see map 6).

At 1900 Greenwich Mean Time on 24 March 1999, NATO air forces began bombing Serbian targets.[43] They focused on Serbian IADS, military C^2 nodes, airfields, and aircraft.[44] NATO commenced the war with 214 dedicated combat aircraft, 112 were from the United States.[45] Initial NATO strikes were met with minimal resistance from Serbian SAMs and fighters. The primary response took place within Kosovo and was directed at the Kosovar population. Forty thousand soldiers of the Serbian Third Army were concealed

Map 6

Kosovo

Source: US Central Intelligence Agency, n.p., on-line, Internet, 18 November 2001, available from http://www.lib.utexas.edu/maps/europe/kosovo_93.jpg.

within the verdant, cloud-covered valley of Kosovo. They were equipped with hundreds of tanks, armored personnel carriers (APC), and artillery pieces and were interspersed among more than a million Kosovars. In addition, a wall of mobile radar-guided SAMs, man-portable missiles (MANPADS), and AAA, as well as a squadron of MiG 21 fighters protected the Third Army against NATO air forces.[46]

In developing air plans against the Serbian Third Army, US planners assumed air superiority and relied on SEAD and electronic-jamming assets to confuse and degrade the Serbian IADS. The planners also assumed strike aircraft could safely enter Kosovo, but two tactical problems still remained: how to locate and identify the targets and how to attack them successfully while limiting collateral damage. A-10 FACs trained in visual reconnaissance and air strike control were selected for the task.[47] A-10 FACs would search out targets identified by either ISR assets during pre-mission planning or in real time by the JSTARS. Once targets were identified, the A-10 FACs would control strikes with available NATO fighters. These fighters ranged in strike capability from USAF F-15Es with LGBs to Italian AMXs with manual bombsights for their unguided, 500 lb bombs.

In response to the rapidly deteriorating situation within Kosovo, General Clark ordered General Short on 30 March to commence attacks on Serbian fielded forces. While poor weather delayed the first successful strikes until 6 April, A-10 FACs were able to fly more than 1,000 missions controlling the skies over Kosovo until 9 June 1999 when a peace agreement was reached.[48]

History of A-10s in Kosovo

A-10s first flew over the Balkans in 1993 when NATO aircraft began conducting air operations over Bosnia. The 81st FS, based at Spangdahlem AB, Germany, continued to deploy to Aviano AB until 1997.[49] The A-10s were the only night-vision goggle (NVG) fighter aircraft capable of providing both day and night CAS and airborne FAC coverage for UN and NATO ground forces. Only the United States had specially trained and combat-ready airborne FACs. The other countries had only trained with NATO ground FACs or US airborne FACs for their CAS missions. Eventually, F-16CG squadrons of the 31st Fighter Wing (FW) at Aviano were trained to use NVGs and assumed most of the FAC duties over Bosnia. With the continual presence of A-10s in the Balkans no longer required, the 81st needed only to conduct yearly deployments to Aviano, thus remaining familiar with Balkan operations and providing FAC coverage when the 31st FW was deployed elsewhere.

In January 1999 the 81st deployed six A-10s to replace an Aviano F-16CG squadron on a stateside deployment. With tensions rising in Kosovo following the Racak massacre, the A-10s were ordered to remain at Aviano, and the squadron increased the number of aircraft to 15 by the commencement of NATO air strikes on 24 March.[50]

Source: Available from http://www.af.mil/photos/fighters2.shtml.

Combat-Loaded 81st A-10s Refueling over Macedonia

A-10s were initially tasked with providing only CSAR for NATO aircrews. An A-10 pilot from the 81st FS was the mission commander for the dramatic rescue of an F-117 pilot shot down near Belgrade on the fourth night of strikes.[51] A-10s provided on-scene command, tracked the survivor's location, coordinated the rescue effort, and provided cover for rescue helicopters during the ingress, survivor pickup, and egress of enemy territory.[52] A-10s continued to provide CSAR coverage for all NATO aircraft flying over Kosovo and Serbia, both day and night, throughout the war.

On 26 March, the 81st was notified by the combined air operations center (CAOC) at Vicenza, Italy, to commence FAC missions on 30 March. While all NATO air strikes to this point had taken place at night, a shortage of EA-6B jammers and F-16CJ SEAD aircraft prevented adding FAC missions to the number of strike missions they were already supporting.[53] Although

Serbian T-55 Destroyed by A-10 with AGM-65 Maverick

initially short of airframes, NATO had sufficient aircrew to double turn SEAD aircraft in support of FAC missions during the day and strike missions at night. A-10s launched from Aviano began flying sorties of six to seven hours down the Adriatic, across Albania, and up into Kosovo (see map 7). Low-level clouds over Kosovo prevented aerial attacks until 6 April, when A-10 FACs located and struck a Serbian truck park, followed by two more successful days of attacks against convoys of Serbian tanks and APCs.

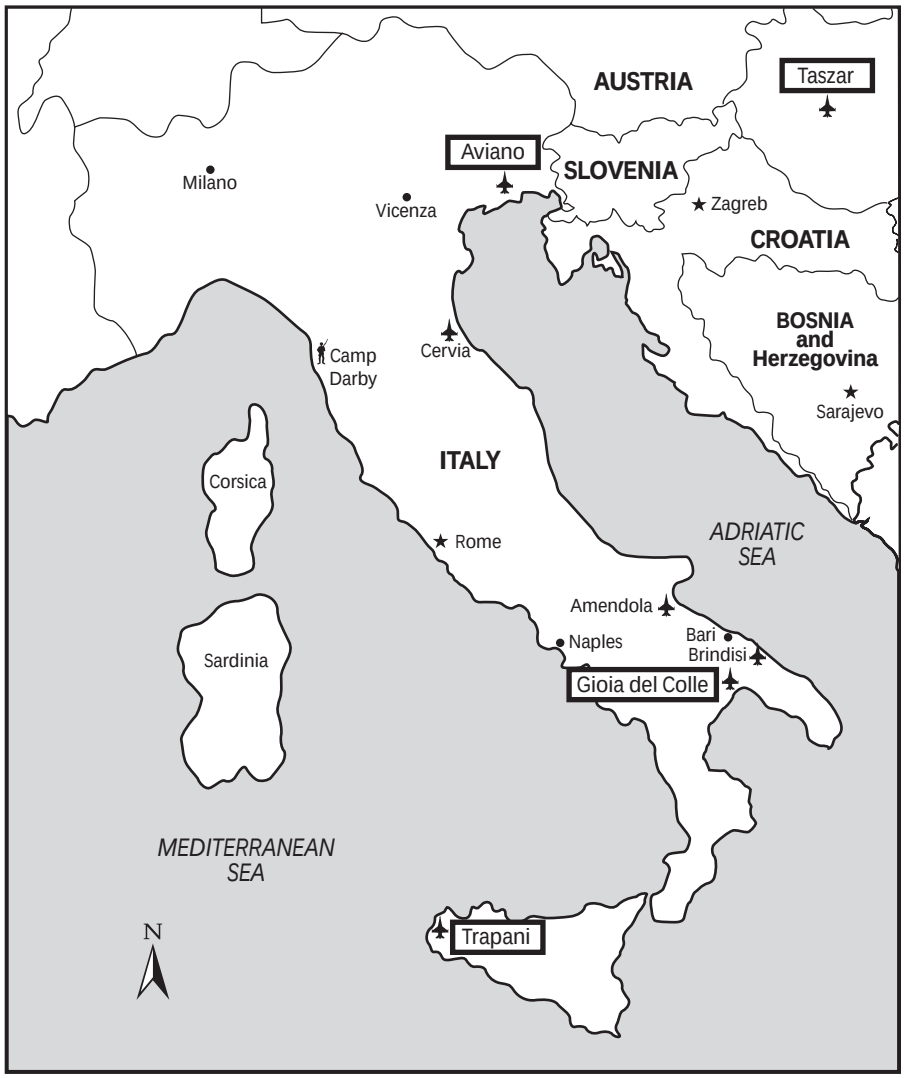
A-10s Move to Gioia del Colle, Italy

The lengthy en route time from Aviano to Kosovo reduced time on station and prevented double turning the jets for two daylight missions per day. Fifteen days into the war, the CAOC ordered the 81st FS to further deploy to an Italian air force base at Gioia del Colle in southern Italy. Sortie duration could thus be reduced by over one hour per sortie, increasing on-station

Harrier Returned from Kosovo Mission

Map 7

Deployed A-10 Locations during Operation Allied Force



time, allowing the jets to fly two daylight missions per day, and giving a much-needed respite to pilots. On 11 April 1999 the jets in Aviano were joined in the move to Gioia del Colle by an additional three aircraft from Spangdahlem.[54] Other NATO squadrons deployed to Gioia del Colle included British GR-7 Harriers, Italian Tornados, and F-104 Starfighters. The Harriers flew as strike aircraft for A-10 FACs on a daily basis and the proximity of operations made for a close working relationship.

A-10 FAC operations at Gioia commenced on 12 April within 24 hours of arrival. With the growing success of strikes against its Third Army, the Serbs increased their active air defenses. A-10 FACs began reporting barrage-fired AAA and SAM launches. On 2 May, an A-10 lost an engine to an

Bomb Damaged A-10 at Skopje, Macedonia

SA-14 IR-guided SAM and was forced to recover at Skopje AB, Macedonia. On 11 May, a mobile SAM struck another A-10 beneath the cockpit. The missile failed to fuze, however, allowing the jet to recover to Gioia.

FAC operations over Kosovo grew to include most of the day and one-half of the night. A-10s covered two four-hour daylight windows over Kosovo while maintaining four aircraft on CSAR alert for night operations. F-16 CGs provided some day FACing, as well as a two- to three-hour night window. The US Navy provided additional day FAC coverage, flying F-14s off the USS *Theodore Roosevelt*.[55] Even more FACs were needed, however, to provide full 24/7 coverage over Kosovo. It was the Air National Guard (ANG) that stepped in to create the 104th Expeditionary Operations Group, which rainbowed expeditionary operations groups from three different A-10 ANG units in Michigan, Massachusetts, and Idaho with a total of 18 aircraft. By early May, the 104th had deployed to Trapani AB in western Sicily. While the lengthy trip from Trapani to the area of operations precluded the 104th from being able to double turn for day missions, they were able to cover a midday FAC window and then turn for late-night missions. Additionally, the 104th deployed three of their aircraft to Taszar, Hungary, in mid-May to perform CSAR alert.[56] This action improved the response time for A-10s in the event of a shootdown over northern Serbia. The final aircraft to join the FAC mission was the US Marine F/A-18D, when a full squadron joined the 104th CSAR detachment at Taszar, Hungary, and began flying over Kosovo by late May.

Late May also ushered in the apex for air attacks against Serbian ground forces. Improved weather and a KLA offensive in western Kosovo forced the Serbian Third Army out of hiding and made the Serbs especially

vulnerable to NATO air attacks. NATO increased the number of FACs and strikers for near-continuous daylight operations until combat operations ceased on 10 June 1999. A-10s then remained on airborne and ground CAS alert until the end of June as Serbian forces departed and NATO occupation ground forces entered Kosovo.

Notes

1. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine,* September 1997, 50.
2. AFDD 2-1.3, *Counterland,* 27 August 1999, 23.
3. Merrill A. McPeak, "TACAIR Missions and the Fire Support Coordination Line," *Air University Review,* September–October 1985, 70.
4. X-ray, Yankee, and Zulu are the military pronunciation for the letters X, Y, and Z, respectively.
5. *Gulf War Air Power Survey (GWAPS) Summary Report* (Washington, D.C.: Government Printing Office, 1993), 12.
6. H. Norman Schwarzkopf and Peter Petre, *It Doesn't Take a Hero* (New York: Bantam, 1992), 371.
7. *GWAPS Summary Report,* 65.
8. Colin L. Powell with Joseph E. Persico, *My American Journey* (New York: Random House, 1995), 498.
9. *GWAPS Summary Report,* 48–51.
10. William F. Andrews, *Airpower against an Army: Challenge and Response in CENTAF's Duel with the Republican Army* (Maxwell AFB, Ala.: Air University Press, 1998), 14.
11. National Training Center Handbook 100-91, *The Iraqi Army: Organization and Tactics* (Fort Irwin, Calif.: US Army, January 1991), 25–31.
12. *GWAPS Summary Report,* 51.
13. Ibid., 49.
14. Ibid., 463–539.
15. Andrews, 29. Air Force assets were not the only air assets attacking fielded forces. Carrier-based F-18s also did so but did not begin to attack the Republican Guard in earnest until a week after the air war had started.
16. Christopher P. Weggeman, F-16 pilot with 388th Tactical Fighter Wing, E-mail interview with author, 28 November 2000. Weggeman flew the Killer-Scout mission against the Republican Guard. The Army was concerned not only with armor but also with support assets such as artillery, mechanized infantry vehicles, support vehicles, ammunition supplies, and petroleum, oil, and lubricant storage.
17. *GWAPS Summary Report,* 106.
18. Ibid., 463–539. F-16s employing nonprecision, free-falling general-purpose bombs, as well as older-generation cluster bomb units (CBU)—Mk-20 Rockeye, CBU-52, and CBU-58—flew the majority, 569, of these missions. Battlefield effectiveness was below expectations, which led to concern over the high-consumption rates of the more modern, armor-piercing CBU-87 during the first two weeks. "CENTAF TACC/NCO Log, January–February 1991" (U), 30 January 1991, 21. (Secret) Information extracted is unclassified.
19. Weggeman.
20. William L. Smallwood, *Warthog: Flying the A-10 in the Gulf War* (Washington, D.C.: Brassey's, 1993), 123–24.
21. Andrews, 44.
22. *GWAPS Summary Report*, 21; and Andrews, 54. F-111Fs developed the tactic using their Pave-Tack laser designator. Lessons learned during a Desert Shield exercise had shown the potential for identifying and targeting armor from medium altitude. On 5 February, two F-111Fs successfully dropped two GBU-12s on revetted positions. Within three days, 50

sorties a night were devoted to tank plinking. Navy A-6Es began dropping a limited number of laser-guided bombs, as did F-15E crews. The F-15Es were limited by the number of LANTIRN pods and quickly developed buddy lasing techniques. Fred L. Frostic, *Air Campaign against the Iraqi Army in the Kuwaiti Theater of Operations,* Project Air Force (Santa Monica, Calif.: RAND, 1994).

23. Andrews, 56.

24. AFDD 2-1.3, 102. Counterland doctrine now incorporates the Killer-Scout mission.

25. Robert C. Owen, ed., *Deliberate Force: A Case Study in Effective Air Campaigning* (Maxwell AFB, Ala.: Air University Press, 2000), xvii.

26. Noel Malcolm, *Kosovo: A Short History* (New York: New York University Press, 1998), 341.

27. Tim Judah, *Kosovo: War and Revenge* (New Haven, Conn.: Yale University Press, 2000), 62.

28. For purposes of this discussion, Kosovar refers to Kosovar Albanians.

29. William Buckley, ed., *Kosovo: Contending Voices on Balkan Interventions* (Grand Rapids, Mich.: William B. Eerdmans Publishing Co., 2000), 100. For purposes of this discussion Serbia and Serbian are used to refer to those forces from the Federal Republic of Yugoslav. Likewise, Macedonia is used to refer to the former Yugoslav Republic of Macedonia.

30. Judah, 171.

31. United Nations Security Council Resolution (UNSCR) 1160, 1998, n.p., on-line, Internet, 15 November 2001, available from http://www.un.org/Docs/scres/1998/sres1160.htm; and UNSCR 1199, 1998, n.p., on-line, Internet, 15 November 2001, available from http://www.un.org/Docs/scres/1998/sres1199.htm.

32. Dick Leurdijk and Dick Zandee, *Kosovo: From Crisis to Crisis* (Burlington, Vt.: Ashgate Publishing Co., 2001), 34. Though the insertion of 2,000 Organization for Security and Cooperation in Europe (OSCE) observers was agreed to, OSCE was never able to get that many into country before their withdrawal in March 1999. Department of State, *Erasing History: Ethnic Cleansing in Kosovo* (Washington, D.C.: Department of State, May 1999), 6.

33. Albert Schnabel and Ramesh Thakur, eds., *Kosovo and the Challenge of Humanitarian Intervention: Selective Indignation, Collective Action, and International Citizenship* (New York: UN University Press, 2000), 35.

34. Judah, 195. While Serbia was threatened by the air strikes if they did not come to an agreement, Kosovars were threatened by the possibility of NATO leaving them to the mercy of the Serbs if they did not sign.

35. Ibid., 206.

36. Ministry of Defence (MOD), *Kosovo: Lessons from the Crisis* (London: Her Majesty's Stationery Office, June 2000), 9.

37. Paul Strickland, "USAF Aerospace-Power Doctrine: Decisive or Coercive?" *Aerospace Power Journal,* fall 2000, 16.

38. MOD, *Kosovo,* 4.

39. Wesley Clark, *Waging Modern War* (New York: Public Affairs, 2001), 176.

40. Strickland, 21.

41. Headquarters USAFE Initial Report, *The Air War over Serbia: Aerospace Power in Operation Allied Force* (Ramstein AB, Germany: USAFE Studies and Analysis, 25 April 2000), 9.

42. Department of State, *Erasing History,* 6.

43. Headquarters USAFE, Initial Report, 15.

44. MOD, *Kosovo,* 34.

45. Headquarters USAFE, *The Air War over Serbia,* 16. By the end of the war, the number of USAF aircraft alone would rise to more than 500.

46. R. Jeffrey Smith and William Drozdiak, "Anatomy of a Purge," *Washington Post,* 11 April 1999, A1.

47. Phil M. Haun, A-10 unpublished war diary. F-16CG (Block 40) FACs with LANTIRN targeting pods were also used primarily as night FACs. FAC duties eventually expanded to include US Navy F-14s and US Marine F/A-18D Hornets.

48. Steven Lee Myers, "Serb Forces under Attack as Weather Clears," *New York Times,* 6 April 1999. By this time, more than 400,000 Kosovar Albanians had crossed over into Albania and Macedonia. Christopher E. "Kimos" Haave and Phil M. "Goldie" Haun, *A-10s over Kosovo: The Victory of Airpower over a Fielded Army as Told by the Airmen Who Fought in Operation Allied Force* (Maxwell AFB, Ala.: Air University Press, 2003), 311.

49. The 81st Fighter Squadron (FS) was relieved to some degree from the continual deployment to Aviano by other active, reserve, and guard A-10 units from 1993 to 1997.

50. Haave and Haun, 311. The total number of A-10s continued to grow during the war, reaching 23 aircraft with the 81st at Gioia del Colle, Italy, and an additional 18 Air Force Reserve aircraft at Trapani, Sicily.

51. Ibid., 42.

52. Sandy was the call sign for A-1D Skyraiders that performed on-scene command of CSARs during Vietnam. A-10s continue to use the Sandy call sign to this day to signify the type of mission being conducted.

53. Though there was a shortage of aircraft, there were enough aircrew available to turn the EA-6Bs and F-16CJs for day and night operations. All conventional fighter and bomber aircraft operating in Serbia or Kosovo were required to operate with jamming and SEAD support.

54. An additional five aircraft, nine pilots, and 65 maintenance personnel from the 74th FS at Pope AFB, North Carolina, arrived in late April to augment 81st FS operations.

55. Haave and Haun, 313.

56. Ibid., 43.

Chapter 5

A-10 Forward Air Controller Tactics

The decision to use A-10 FACs as mission commanders for daytime-strike missions over Kosovo was based on the need to locate and attack the Serbian Third Army without the aid of a friendly ground force. Along with more than 40,000 troops, the Serbians deployed a sophisticated IADS, which included a squadron of MiG 21s, mobile SA-6 radar-guided missiles, hundreds of shoulder-launched MANPADS, and AAA.[1] In response, NATO manned continuous air-to-air combat air patrol to keep the MiGs in their underground bunkers, while SEAD fighters carrying high-speed antiradiation missiles (HARM) and Marine and Navy EA-6B radar jammers kept the SA-6s silent.[2] Restrictions to flight operations below 15,000 ft further decreased the threat from MANPADS and AAA. A-10 FACs led up to 40-ship packages into Kosovo comprised of aircraft from 10 NATO countries. A-10 FACs searched and located targets from medium altitude, then attacked and controlled strikes by NATO fighters onto Serbian armor, artillery, trucks, and AAA.[3]

This chapter depicts an *actual* A-10 FAC mission in late April 1999. It includes the essential mission elements of VR/SC and strike—all conducted with extraordinary effort to minimize collateral damage to the hundreds of thousands of Kosovar refugees.

The first flight of the day, Cub 31, is scheduled to arrive on station in the eastern half of Kosovo, code-named NBA, one hour after dawn.[4] Unlike Misty FACs who flew two pilots in a single jet, the A-10 FACs fly single-seat in two-ship formations for additional mutual support and firepower. The mission commander, Cub 31, is a qualified FAC accompanied by his wingman, Cub 32. A total of four A-10 FAC two-ships are required, two in the east and two in the west, to cover Kosovo for this three-hour vulnerability window. The air tasking order (ATO) requires three FAC packages during the day, followed by a single night-vulnerability period to be controlled by F-16 FACs.[5]

In addition to being the FAC-package mission commander, Cub 31 is assigned the duties of embedded Sandy.[6] Should one of the aircraft in the package be shot down, Cub 31 will assume CSAR mission command. These duties are the same as those of the A-1 Sandys in Vietnam: to locate and authenticate the survivor and to suppress any threat to the survivor or rescue helicopter. Other Sandys also escort the helicopter in and out of enemy territory. The insertion of Sandys into the FAC package reduces the response time by as much as two hours over the alternative of maintaining A-10 Sandys on strip alert.

Intelligence has spent the night surfing classified Web sites in search of potential targets.[7] They have prepared the daily "hog menu du jour," a

folder which today is composed of five photographs of Serbian armor and artillery taken by U-2s and national satellites.[8] An additional source of imagery comes from tactical reconnaissance photographs taken by GR-7 Harriers collocated with the A-10s at Gioia del Colle AB in southeastern Italy.[9] The physical proximity of the two units allows for promising photos to be expedited to the next A-10 before launch. Unfortunately, only one photo of the five is less than 12-hours old, and none has been taken within the last six hours.[10] Six hours is the threshold beyond which most FACs consider it unlikely the target will remain in place. While the Serbs tend to keep their vehicles stationary on clear days, they will relocate them on overcast days and during nights.

Cub 31 spends several minutes reviewing the frag order, including the special instructions and the banners that accompany the ATO. Changes to the ROE are of particular interest. Altitude restrictions have remained fairly constant since the 14 April bombing of a refugee column. That incident has reduced to 5,000 ft the minimum altitude FACs may fly to identify targets positively.[11] What has changed are the restrictions to targets and the process for target approval. No-attack zones within 10 miles of the Macedonian border have created a sanctuary that Serbian armor has quickly taken advantage of.[12] Although strikers are still free to attack armor, artillery, and AAA, concern regarding NATO cohesion in the face of another collateral damage incident means Cub must now get approval from the CAOC to attack any trucks.

After receiving the latest changes, Cub now heads for the mass briefing room, an entire wall of which is dominated by a 1:50,000-scale map of Kosovo. On it are marked the latest updates on Serbian activity and NATO strikes from the previous day's missions. After the weather and intelligence briefings, Cub 31 quickly gives the other FACs the plan for the mission. Most of the information is already on the lineup cards, courtesy of the squadron's mission planning cell (MPC). Coordination with other aircraft for this mission comes from Aviano AB in northern Italy, where the wing MPC has generated a mission-data card that includes all the aircraft call signs, frequencies, tanker times and tracks, and a plethora of deconfliction information required to coordinate many aircraft within such a confined airspace.

One hour prior to takeoff, Cub 31 dons his flight gear and checks out a pair of 12-power space-stabilized binoculars that is his primary means of positively identifying Serbian armor.[13] After meeting his wingman at the duty desk, Cub 31 gets the tail number for his aircraft and a final brief from the squadron supervisor before stepping to the jet.

A-10 and A-10 FAC-Munitions Load

The A-10 Warthog is a great choice for a FAC aircraft for several reasons. The greatest advantage lies in its pilots, specifically trained in FAC, CAS,

and CSAR missions. Most A-10 FACs have more than one thousand hours in the airframe and have spent that time training to kill armies. The pilot is afforded exceptional visibility and an extensive communications suite of radios that provide UHF (including Have Quick II) and very high frequency amplitude modulation and frequency modulation frequencies.[14] The jet has excellent self-protection capabilities: an ALR-69 radar warning receiver, the ALQ-131 ECM pod, 120 bundles of chaff, and 180 flares. In addition, the rugged, twin-engine jet is designed to take hits; it comes equipped with a redundant flight-control system and a titanium-armored cockpit.

A-10 FAC Flying over Macedonia with Full Combat Load

The A-10—a large fighter aircraft built around a 30 mm, tank-killing Gatling gun with a total of 11 hardpoints on its wing—carries a wide variety of munitions. It also carries the Pave Penny Pod, a laser-spot tracker that indicates in the heads-up display (HUD) the position on which a striker has trained its laser. This enables the FAC to confirm the target before strikers release their bombs. Although the A-10 is assigned primarily to daytime FACing over Kosovo, the jet is the first USAF fighter with an NVG-compatible cockpit. Its slow speed, for which it is often maligned, is a tremendous asset in the FAC role, which allows for longer, more accurate looks at targets than can be gained from faster aircraft.[15] Also, the fuel efficiency of its bypass-fan engines gives the jet up to one and one-half hours of loiter time between refuelings. Such features are critical to the success of A-10 FACs in locating Serbian positions.

The A-10's weapon load-out is custom built for the FAC mission. On outside stations one and 11 hang two AIM-9 heat-seeking missiles and the ALQ-131 ECM pod. The next inboard stations, two and 10, carry two rocket pods, seven each, 2.75-inch Willy Pete rockets.[16] Willy Petes are

the primary method of marking targets as their smoke is easily seen by the naked eye or through a targeting pod.[17] Stations three and nine boast two 500 lb, precision-guided AGM-65D Maverick missiles. This IR version of the missile locks onto the heat contrast between the target and its background. The long standoff range and the 125 lb shaped warhead make this fire-and-forget munition ideal against armor.[18] Center stations four, five, seven, and eight hold Mk-82 low-drag, 500 lb general-purpose bombs configured with FMU-113 radar-proximity fuzes.[19] Detonation of the bomb at 10–25 ft above the ground enhances the fragmentation pattern and is more effective against mobile targets than an impact fuze. Internally, the seven-barrel GAU-8A Gatling gun carries more than 1,100 armor-piercing and high explosive rounds.

Although an exceptionally well-constructed CAS aircraft, the A-10 has its weaknesses. The aircraft is designed for low-altitude flight, is underpowered at medium altitude, and lacks the technical sophistication of a radar, a GPS-navigational system, a data link, and a targeting pod.[20] The jet has a high-radar cross section that makes it easily detectable by enemy radars, and its slow speed makes it susceptible to AAA and MANPADS at low altitude.

Flight Profile of an A-10 FAC

Upon takeoff from Gioia del Colle, Cub begins a turn to the east and climbs to flight level 190 (19,000 ft). The flight then contacts Magic, the NATO airborne early warning aircraft responsible for airspace control over the area of responsibility.[21] It takes 45 minutes to cross the Adriatic and reach the tanker track over central Macedonia where a KC-135 is already waiting. After topping off the jets, Cub turns north and contacts Moonbeam for the first of their two vulnerability windows (see map 8).

Moonbeam relays the CAOC's top two target priorities and confirms that both the required F-16CJ HARM shooters and EA-6B jammers are on station. Cub 31 plots a course to these targets and updates his search plan. The sky over the southern half of the border is clear, but low clouds to the north threaten to blanket the entire valley. Cub 31 arms his weapons, his flares, and his electronic self-protection systems as he approaches the border. He begins searching the foothills along the major LOCs as he proceeds to the two CAOC target areas. Finding nothing at these locations, he moves on to check out his preplanned targets and compares the terrain with the target photographs. When these do not pan out, Cub continues to expand his search for the remainder of his 45-minute vulnerability window and looks for any unusual signs that might indicate enemy activity.

Bear 11, another two-ship of A-10 FACs, checks in on frequency and takes over control of the eastern half of Kosovo as Cub heads for the second tanker. After refueling, the flight returns for a second vulnerability window. This sortie is scheduled for a total of 4.0 hours, of which 1:45 will be spent in VR/SC (see table 2 for an A-10 FAC mission profile).

Map 8

Flight Profile of an A-10 Forward Air Controller

Table 2

A-10 Flight Profile, April 1999

Reference Time (T Hour) . . . Takeoff Time
T minus 2:00 . . . . . Pre-mission Briefing
T . . . . . Takeoff
T – T+:45 . . . . . En route to Macedonia tanker track
T+:45 – T+1:00 . . . . . Refueling (4–5,000 lbs offload)
T+1:00 – T+1:45 . . . . . Visual Reconnaissance/Strike Control
T+1:45 – T+2:15 . . . . . Refueling (4–5,000 lbs offload)
T+2:15 – T+3:15 . . . . . Visual Reconnaissance/Strike Control
T+3:15 – T+4:00 . . . . . Return to base

Total Area Time 1:45
Total Flight Time 4:00

Threat Avoidance

The primary threat to the A-10 comes from heat-seeking MANPADS. Cub 31 limits this threat by remaining at 15,000 ft AGL to the maximum extent possible. When conducting lower-altitude passes (5,000–10,000 ft) for target identification, he limits himself to one pass only and uses a combination of jinks and flares when climbing back up to altitude. Cub 32 trails a mile behind slightly above and offset from Cub 31. As a wingman, Cub 32's purpose is to provide mutual support by covering the lead and calling out all SAM launches.[22] This task is difficult if MANPADS launch because the missiles are extremely fast and their pencil-thin smoke trail is hard to see. Wingmen barely have time to call for flares before the missile zips through the flight.

As indicated before, one key to avoiding the hundreds of MANPADS spread throughout the Kosovo countryside is to limit the number of passes made on any given target. While this may seem commonsensical, the less obvious reason lies in the limitations of the aircraft. For the underpowered A-10, each pass bleeds off energy in terms of both altitude and airspeed. Diving attacks performed back-to-back leave the jet low, slow, and vulnerable to attack during the climb back to altitude.

For SA-6 operators to get a kill, they must lock-up to the aircraft with the tracking radar and then launch a missile, which homes in on the reflected radar energy bouncing off the aircraft. However, the threat from the SA-6 is greatly diminished by the presence of HARM shooters. An F-16CJ or German ECR Tornado SEAD aircraft can launch HARMs at the SA-6 radar while it is illuminating its target. So the dilemma for the operators becomes whether or not to target strikers and run the risk of being killed. For the most part, the SA-6s in Kosovo have remained silent.

SA-6 operators have been even more reluctant to fire missiles during the day, when the huge, white smoke plume from the launch and rocket motor creates a prominent trail straight back to the operator's location. One A-10 FAC, tongue-in-cheek, believes the biggest threat from an SA-6 launch is the potential for a midair collision of fighters in pursuit of the smoke trail, all vying for the kill. This has hardly been the case at night. Although an SA-6 launch is easy to see, its precise whereabouts have proven difficult to locate, even with targeting pods and NVGs.

AAA is in abundance but easily avoided by staying above 5,000 ft. Most of the AAA is 37 mm or less, with only a few 57 mm pieces and no radar-guided AAA in Kosovo. The only visible signs of AAA fire during the day are the small, white clouds that appear as shells explode below the jets. Given that, it is still difficult to locate the gun positions. Unlike nighttime operations when tracers and muzzle flashes are evident, the use of muzzle flash guards on AAA barrels prevents the daytime sighting of all but the small, brown dust clouds generated as the rounds are fired. Even then, to see the dust kick up the A-10 FAC must be looking directly at the AAA pit when it is firing. Small arms, on the other hand, have a distinct red muzzle

Destroyed and Abandoned SA-6 Launcher in Kosovo

flash, which is easily identifiable, particularly if they are fired from a shaded area. More than one Serbian infantry company has highlighted its position by recklessly firing at A-10s circling overhead.

Visual Reconnaissance and Target Identification

The most important quality of a good FAC is the ability to locate targets. A saying among the A-10 FACs is, "95 percent of tactics is simply finding the target." The same traits that it took to be a good Misty FAC are important to the A-10 FAC. First, it takes hours of visual reconnaissance to get sufficiently familiar with the area to begin to discern Serbian armor and artillery. Although Kosovo is 60 x 60 miles, the Serbian army operates in a relatively small area in and around the larger towns, along the major LOCs, and near the border. Learning where not to look streamlines the VR effort. Pre-mission study of the reported Serbian positions helps to determine where the focus of the day will be. If unsuccessful, the scope can then be increased to widen the search area.

The key to locate targets is knowing what indicators to look for. The first rule is to note anything unusual or out of place. Clues are as subtle as knowing that Kosovo farmers, when harvesting hay, produce several large bales of hay per field. A field with only one or two large, rectangular hay bales warrants closer inspection and may reveal a tank's main gun barrel protruding through the straw.[23] As the spring rains begin to subside and the ground begins to dry, the nighttime movement of the heavy military vehicles produces tracks in the grass. The tan-colored soil leaves visible tracks in a tank's path. The tracks leading from an empty berm may be

used to locate Serb armor hidden in a nearby barn or tree line. In forests, any shape with a 90° angle is suspicious. In addition, the Serbs, knowing A-10 FACs will not strike civilian vehicles, have begun using white buses for transporting troops. A bus parked near a stand of trees is a neon billboard to a smart FAC to begin a search of those woods. Though a trail leading to berms inside a stand of trees may seem well concealed, it actually stands out when viewed from directly overhead. Even Serbian army barracks already destroyed by NATO bombs can be a lucrative location to start a search. The area may still be home to some of the Serbian soldiers, and stray vehicles can be found in and near the compounds. Such insights and trade secrets are often exchanged between FACs at the squadron after a mission or at a restaurant during the evening meal.

Second, a disciplined scan pattern has to be developed along with a proficiency in the use of binoculars. While aircraft vibration makes it difficult to focus high-power binoculars, the introduction of commercially available, space-stabilized binoculars has alleviated this problem. From 15,000 ft it is now possible for a skilled FAC to identify armor and even distinguish between tanks, APCs, and self-propelled artillery. With the naked eye, he first selects an area of interest, then concentrates on a specific point for three to four seconds before moving to the next.[24] The binoculars are not used until a potential target has been located. Due to the narrow field of view of the binoculars, it takes practice for the FAC to be able to relocate the target while looking through the binoculars. He must first note a nearby prominent landmark to ease the transition before peering through the lens. Likewise, once a target is identified and before the binoculars are put down, the relationship between the target and the landmark is noted. More than one Serbian tank has escaped because the failure of a FAC to relocate it after lowering his binoculars.

Third, one flight technique for reducing the slant range when viewing targets is to keep the jet in a 30° bank, which allows the pilot to search almost directly underneath the jet's flight path. As seen in figure 3, this reduces the slant range by more than a mile in comparison to a level flight path.[25]

Fourth, some FACs are simply better at finding targets than others. Good mission prep, a positive attitude, and keen vision seem to be common denominators of exceptional FACs. Even a highly skilled FAC can use the help of other assets, though, the most important of which are the JSTARS and the USAF Predator UAV.

JSTARS is a long-range, air-to-ground surveillance system onboard an E-8C, a modified Boeing 707. It consists of synthetic aperture radar, which is capable of producing a radar image of a selected area and a moving target indicator (MTI), which is designed to locate slow-moving ground targets. JSTARS has the unique capability of tracking hundreds of vehicles throughout Kosovo with its MTI but lacks a viable onboard target identification system.[26] While JSTARS can view all vehicles moving around Kosovo, it cannot distinguish a T-72 tank from a tractor pulling a trailer loaded with refugees.[27] Collateral damage concerns, which dictate a visual target

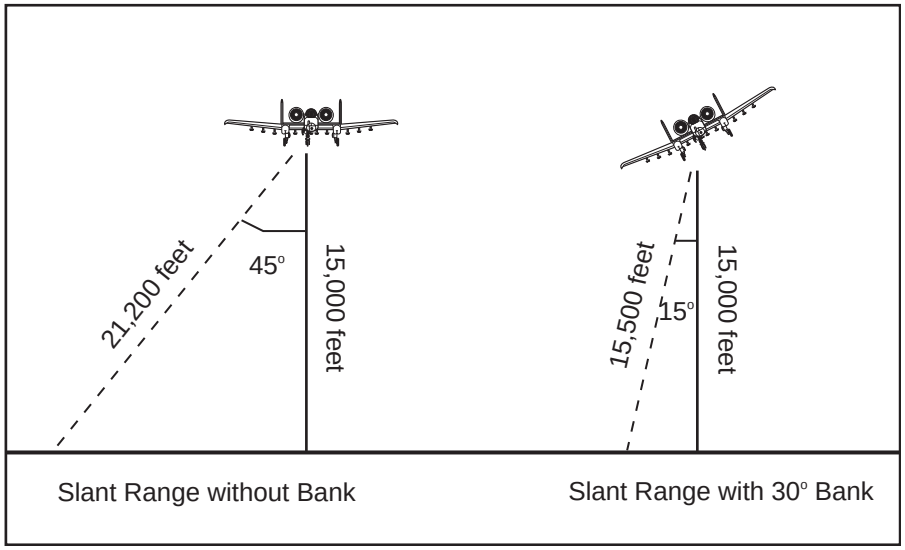


Figure 3. Decreasing Visual Reconnaissance Slant Range with Bank Angle (note the A-10's cockpit visibility allows for a downward 45° view angle in level flight)

identification criterion, greatly reduce the potential utility of JSTARS in this conflict. To overcome this challenge, JSTARS has developed tactics to correlate its tracking data with positive target identification from UAVs and has, on occasion, been able to provide real-time targeting information to FACs.

While UAVs such as the Predator have been used in the past for surveillance, they also show great promise in locating and identifying targets from low altitude without risk to pilots. Over Kosovo, Predators conducted surveillance and for the first time provided real-time targeting information to the A-10 FACs flying overhead. Effectiveness of the tactics is somewhat limited by the lack of previous Predator experience with FAC procedures, which makes tasks such as altitude deconfliction and target talk-ons difficult.[28] Although UAVs have never been fully integrated into the ATO with strike packages before, operational techniques have quickly been patched together to test their capabilities. Qualified ground FACs at the CAOC can now monitor the Predator's video and conduct target talk-ons directly with A-10 FACs overflying the target area.[29]

Joint Surveillance, Target Attack Radar System

The occasions when such efforts have proven successful provide a glimpse into the real-time use of UAV platforms with conventional strike aircraft. On

one occasion, Moonbeam directed Uzi 11, an A-10 FAC flight, to a specific set of coordinates.[30] Once there, they received a target talk-on from the CAOC's ground FAC to an L-shaped building. Given immediate permission to attack the building, they struck it with three 500 lb bombs. Later, when Predator detected Serbian soldiers walking next to the building, the flight was directed to reattack the site.

RQ-1 Predator

Despite the aid of JSTARS and the Predator, the efforts of Serbian Third Army at concealment and deception continue to complicate target identification. The Serbs have placed their armor in such politically sensitive locations as next to churches and inside houses. They have also placed dozens of artillery and armor decoys throughout Kosovo to draw off NATO bombers. Although it is very difficult to tell the difference between real armor and decoys from altitude, the A-10 FACs have developed a few tactics to compensate. The simplest way to determine if a target is a decoy is to blow it up; if there is nothing left of the target afterwards, then it was a decoy.[31] Still other decoys are conspicuous because of their location. If a tank is sitting out in the middle of a field in broad daylight, it is likely a decoy. Another telltale sign is the lack of any fresh track marks or other indications of recent vehicle movement in the area. Again, the only way to know for sure is to blow it up. The thought of wasting munitions, particularly expensive precision-guided weapons, is disconcerting to most FACs. No one wants to make the mission report that they have just killed an inflatable tank decoy with a $100,000 Maverick missile. Still, to pass up on a target simply because it looks too good to be true is self-defeating. There have been many instances of FACs taking a target for a decoy, only to be pleasantly surprised when it sends up a secondary explosion.

The FAC mission of Swine 01, ended in just such a discovery on 7 June 1999, two days prior to cease-fire. Locating an incredible 10 artillery pieces, Swine directed British Harriers to drop a single Mk 83, 1,000 lb bomb onto one of the decoys. When a massive explosion rose up from ammunition stored nearby the pit, Swine moved in for more kills by attacking and controlling the Harriers and some F-15Es for strikes on all the remaining pits.[32]

Artillery Decoy

A-10 Strike Control

Once Cub 31 has identified a target as valid, he must determine what aircraft and weapons can best be used to attack it. Along with the weapons carried by his flight, there are also NATO fighters scheduled throughout the vulnerability window. These strikers have been given secondary targets on which to drop their bombs if the FAC does not find fresh targets.[33]

Artillery Destroyed by Swine 01

NATO strikers potentially available to Cub come from nine different nations (see table 3).[34] The arsenal varies greatly from F-15E Strike Eagles carrying LGBs to Italian AMX fighters with neither precision munitions nor a computing weapons delivery system for the Mk-82s they carry. Although B-2 and F-18 aircraft carry the newest GPS munitions, these weapons are not made available to the FAC missions. The majority of strikers are fully capable of hitting the targets assigned them. Unlike in Vietnam, where US fighters had difficulty in killing targets that Misty FACs located; once an A-10 FAC identifies a target, it can be destroyed.

Table 3

NATO Strike Aircraft

United States	A-10, F-16CG, F-15E, F-14, F-18, AV-8B, F/A-18D
France	Super Etendard, Jaguar
United Kingdom	GR-7 Harrier
Netherlands	F-16AM
Belgium	F-16A
Canada	CF-18
Spain	EF-18
Italy	Tornado IDS, AMX
Turkey	TF-16

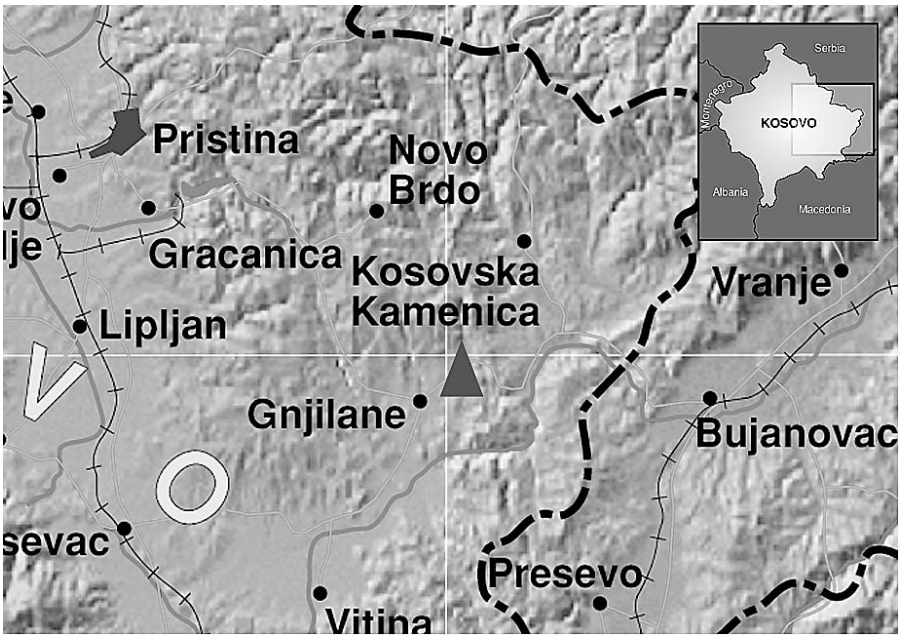
The weapons to be used, then, depend upon the nature of the target found. Precision weapons, such as LGBs or the Maverick, are required against tanks, artillery, and AAA. These targets are either armored or protected by earthen berms and require a direct hit to be taken out. CBU and general-purpose bombs are best used against soft-skinned vehicles and dispersed targets, such as troops in a tree line.

Cub 31 returns for the second vulnerability window and finds that clouds have moved in and left only the southeastern part of NBA visible. Cub heads to the city of Gnjilane to begin a search of the surrounding foothills where there has been previous enemy activity. He locates a row of eight freshly occupied artillery pits and calls up Moonbeam, who quickly lines up a two-ship of CF-18s, call sign Merc 11.[35] The CF-18s are carrying 500 lb LGBs. Cub passes coordinates, gives them a target area update, and begins a talk-on. “Call visual the factory that is just east of the huge town that is on the east-west hardball.” G-town (Gnjilane) is the only large town in eastern Kosovo. On the east side of G-town is an enormous factory complex next to the highway that leads east out of the town (see map 9).

Merc 11 replies, “Copy. I see one factory. Large structure has a blue roof building to the west.” Merc 11 not only responds that he sees the factory but also confirms it by giving a positive description of a distinct feature. “That’s affirmative, let’s use that factory east-west one unit. From the eastern edge of factory go two . . . let’s make that three units east on hardball. Then use factory from hardball. You’ll see a pull-off on the north side

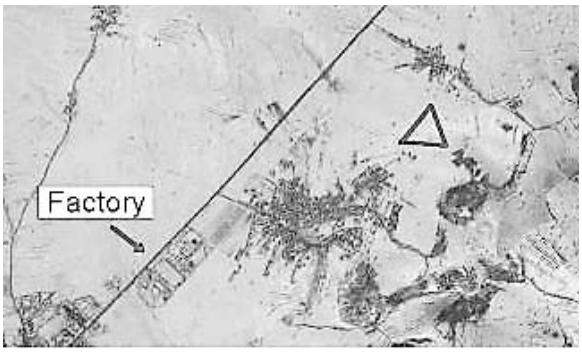
Map 9

Target Area Near Gnjilane



of the hardball. Go one unit to the south off the hardball. In between two small towns you'll see some light revetments." Cub continues the talk-on by setting the length of the factory complex east to west as a unit. He treats that unit as a yardstick and measures the distance along the road to another feature (a pull-off). He talks Merc 11 down between two towns where the artillery is lying.

Merc 11 responds, "Copy light revetments, there appears to be four to the south and four to five to the north." Merc 11 has the revetments in sight and again gives a description of what he sees. The revetments appear light due to the light sandy soil in this region of Kosovo in contrast to the darker green grass of the field where the revetments have been dug. "Copy. That is affirmative. Say your laser code." Cub wants the laser code to enter in his Pave Penny Pod to ensure Merc's laser is actually pointed at the right target. "Laser code is 1,633." Merc is ready to attack and extends to the southeast some 10 miles from the target for his run in. Cub clears Merc to drop when he calls inbound.



1:5 Meter Imagery of Target Area

Merc shacks (directly hits) the artillery piece. He sets up for a subsequent attack and takes out another piece before running low on fuel and departing.

In the meantime, Dragon 61, a two-ship of F-15Es checks in carrying 500 lb LGBs as well. Dragon locks up Cub with his air-to-air radar. Dragon is to call when he is visual Cub, a fairly easy task, as a two-ship of A-10s circling a target looks like a pair of large Xs in the sky. Dragon calls visual and Cub rolls in to mark, this time with Willy Pete rockets. He shoots three rockets, expecting to get them to blossom into small white phosphorus clouds near the target. As long as Dragon is watching the general target area, he will easily see the smoke generated by the rockets.

With the A-10's computing weapons delivery system, an accurate rocket can be shot from as far off as four miles slant range, which allows Cub to recover well above 10,000 ft. He shoots multiple rockets in case one is a dud. He can also refer to the distance between the rockets as an additional unit of measure, if necessary. In this case, though, the rockets land next to the artillery pits. Dragon 61 confirms the smokes, "61 is contact two smokes." "Copy. Look at the further northeast smoke. It's sitting just on the east side of four artillery pits south of a road." Even though the smokes are visible, the artillery pits are so small that Cub has to ensure Dragon has them in sight. Dragon calls contact the target area. Cub is starting to run low on fuel and wants to get the F-15Es dropping as soon as possible. Dragon is not a FAC and therefore not authorized to pick his own target to drop on. He can, however, continue an attack once Cub gives him permission. Cub passes Dragon control of the targets. "You have flight lead control on that target area. I'd like [you] to take out as many of the artillery sites [as you can] at that position. Two have already been struck. Those are two just north of the east-west road." Cub 31 departs for the tanker, and Dragon continues his attack and destroys an additional three artillery pieces. Heading home, Cub 31 contacts Moonbeam and passes on the BDA for his flight and the fighters he has controlled.

Not all attacks run so smoothly. In this case, these artillery pits were found in an open field with little risk of collateral damage. Also, there were no AAA or MANPADS launches seen, although the area is known for having active air defenses. Likewise, two sets of precision-bomb-dropping strikers were readily available, native English speakers manned both sets. Though the official language for NATO is English, there is a considerable range of language skills among pilots, with particular difficulties for those from nations such as Turkey and France.[36]

A-10 Strike

An advantage that Cub 31 has over Misty is the large number of munitions that he and his wingman carry. This gives Cub the option of destroying targets without having to call in strikers, a capability especially useful against fleeting targets. Although, for the most part, the Serbs do not move

Serbian artillery piece was destroyed on 7 June 1999 by an F-15E's laser-guided bomb. The target was located, and the F-15Es were controlled by an A-10 FAC.

their vehicles under clear skies, an occasional mobile APC or tank will be spotted. Other fleeting targets include those in areas where cloud cover is beginning to form. The weather over Kosovo for much of April has been chronically disruptive to strikes. In this case, there may not be time to bring in other fighters before the hole in the clouds closes up. This added flexibility for A-10 FACs has proven a great asset.

Against armor, the weapon of choice is the AGM-65 Maverick. As long as there is good heat contrast, Cub can fire this 500 lb air-to-surface missile from three to four miles out.[37] The Maverick, while good at killing armor, does not make for a good mark. Too often, Cub has to come off target dry (without firing) because of inadequate contrast. Also, unless the strike produces secondary explosions, the fighters will not be able to see the impact. Cub reserves his Mavericks for armor and other precision deliveries, such as those against dug-in artillery pieces.

A-10 Firing an AGM-65 Maverick

The four Mk-82 airburst bombs that Cub carries are excellent against soft targets. With the computing sight onboard, the bombs can be delivered very accurately, even against individual vehicles. They can also be used as marks, adding killing power beyond that of a rocket.[38] However, the cloud generated from an Mk-82 dissipates rapidly and, unless a fighter is looking directly at the target area at impact, he will likely miss the mark. Also, the bomb cloud is darker and provides less contrast than that of a Willy Pete mark.

The last weapon available to Cub is the 30 mm gun, which he uses as his tertiary weapon. As an embedded Sandy, he must reserve half of the rounds for use in case a rescue is required. Also, the extreme slant ranges required at medium altitude greatly reduce the gun's armor-killing potential.[39] To enhance its effectiveness, Cub must descend to below 10,000 ft. Given the shortage of targets and the wide availability of other weapons, he rarely resorts to the gun.

Return to Base

Cub lands at Gioia del Colle four hours after departure. Upon landing, the pilots head straight to intelligence. Cub 31 goes to the briefing map and points out all the target areas identified and those attacked. The next set of A-10 FACs are just arriving for their briefing, which allows Cub 31 to take the mission commander aside for an update on the weather in Kosovo and likely target areas.[40] Next, Cubs 31 and 32 must review their HUD videotapes and answer any additional questions for the intelligence mission report. Cub 31 then debriefs his wingman over a sandwich before heading to the hotel for their 12-hour crew rest for tomorrow's mission.

Effectiveness of A-10 FACs

Measuring the effectiveness of A-10 FAC operations is difficult. Clearly, NATO strikes failed to prevent Serbian ground forces from conducting widespread ethnic-cleansing operations against Kosovar Albanians. In fact, the majority of Serbian atrocities occurred prior to the start of A-10 FAC operations.[41] Other critics claim the attacks against the Serbian Third Army had only a marginal impact on Milosevic's decision to capitulate. They point instead to other factors, such as strategic strikes on Belgrade, the withdrawal of Russian political support, and even the remote threat of a NATO ground invasion.[42] Still others assess the direct attacks as inefficient. One senior Air Force officer estimated that as many as 15 sorties were required to kill a single Serbian tank.[43] However, others have pointed to desertions by Serbian soldiers and to civilian demonstrations against the deployment of further army reserve units to Kosovo as evidence of the influence the attacks against the Serbian Third Army was having on Serbia.[44]

Yet, A-10 FACs were indeed successful in keeping the Serbian Third Army from using its armor to conduct ethnic-cleansing operations. To empty a

village, the standard operating procedure of the Serbian army had been to take a company of tanks and form a wide horseshoe around the village, with the opening of the horseshoe pointed toward the nearest border.[45] Serbian paramilitary police would then enter the village and grant the villagers as little as 30 minutes to leave their homes with whatever possessions they could manage to take with them. The introduction of A-10 FACs stopped the use of these tactics. The Serbs had to hide during the day and disperse their equipment to avoid detection. The threat from A-10s circling overhead forced the Serbs into a defensive posture, thus slowing their daytime movements and reducing the effectiveness of subsequent attacks on Kosovar civilians.

Unfortunately, the Serbs adapted by using civilian vehicles to continue their attacks. While A-10 FACs had the ability to keep the roads clear of all vehicle movement, NATO's concern over collateral damage prevented such strikes. The 14 April attack on a Kosovar refugee column by NATO fighters made the situation particularly tense. Serbian soldiers were free to jump out of their APCs and into Kosovar Albanian's abandoned Yugos to continue their operations. The requirement for positive identification of all vehicles severely restricted the use of JSTARS, as well as all nocturnal FAC operations. While FACs using NVGs and targeting pods could locate moving vehicles, these night devices lacked the clarity required for positive target identification. Unlike Vietnam, when fighters found it impossible to hit targets at night, US fighters over Kosovo had the capability to destroy targets but lacked the permission to do so.

In addition to target identification requirements, theater ROE also restricted most NATO aircraft to above 15,000 ft. This meant that cloud decks over Kosovo could be no lower than 20,000 ft for A-10 FACs to operate.[46] As the campaign progressed, the poor weather of late March and early April gave way to blue skies in late April and May. This granted A-10 FACs more coverage time and greatly increased the number of targets identified and attacked. Likewise, the number of Serbian claims of collateral damage began to rise. In response the CAOC systematically wrested control authority away from the FACs. By June, FACs were forced to seek clearance for attack on each target acquired.

The refusal of US political leadership to deploy ground forces further complicated matters. This freed Serbian forces to defend almost exclusively against attack from the air. Serbian armor, which would have been lined up to protect entry routes from Albania and Macedonia, was instead dispersed throughout Kosovo. This lack of a ground threat greatly vexed the air campaign and made the A-10 FAC mission even harder. A-10 FACs did take advantage of the Kosovo Liberation Army's offensive in western Kosovo, which forced Serbian forces out of hiding. Though the KLA was soundly defeated, the Serbs suffered mounting losses from NATO strikes just days before Milosevic capitulated.

The final critique of A-10 FAC operations lies in the assessment of attrition to the Serbian Third Army during the 78-day air campaign. However,

producing an accurate assessment proved just as problematic as locating and identifying Serbian armor. Unlike Operation Desert Storm mission objectives, which called for a 50 percent attrition of Iraqi armor, no such quantitative objective was ever set for Kosovo. Furthermore, the total number of Serbian armored vehicles in Kosovo was never well tracked, which left no way for NATO intelligence to assess attrition rates adequately, even if that had been an objective.

The question of BDA count was not raised until after the war when the press filmed the Serbian Third Army as it withdrew from Kosovo. The measure of effectiveness of the air attacks was then reduced to the question of how much armor was destroyed. In a September 1999 NATO news conference, General Clark was asked how much of the Third Army was destroyed, to which he simply replied, "Enough."[47] This alludes to the fact that NATO air strikes against the Serbs in Kosovo were designed for coercion and not attrition. Two of NATO's objectives were those of deterring Serbian action against the Kosovar Albanians and of reducing the ability of the Serbian military to continue offensive operations. The success in meeting these objectives was measured not by the number of vehicles destroyed but by the action of the Serbs. In the end, the Serbs conceded to NATO's demands and withdrew from Kosovo.

Nonetheless, the fact remains that the primary target of NATO warplanes over Kosovo was the Third Army's armor and artillery. It seems reasonable that an accurate BDA would shed light upon the effectiveness of attacking fielded forces at the tactical level. Unfortunately, BDA has been clouded by controversy since the final day of strikes. Table 4 reflects the BDA reported from several sources. Regardless of which set of numbers are closest to being accurate, having an accurate number or percentage of vehicles destroyed is meaningless without a yardstick to measure overall effectiveness.

Table 4

Allied Force Tactical Bomb Damage Assessment Estimates

BDA Source	Tanks	Armored Personnel Carriers	Artillery
Shelton, 10 June 1999	20	220	450
Serbian, 16 June 1999	13	6	27
Newsweek, 15 May 2000	14	18	20
NATO, 16 September 1999	93	153	389

Source: Secretary of Defense William Cohen and Chairman of the Joint Chiefs of Staff Henry Shelton provided an initial bomb damage assessment in a 10 June 1999 briefing, Washington, D.C., n.p., on-line, Internet, 10 June 1999, available from www.defenselink.mil/news/Jun1999/t06101999_t0610asd.html.

Author's note: These numbers were refuted by a much lower total given on 16 June 1999 by Serb army Lt Gen Nebojsa Pavkovic. Rebecca Grant, "True Blue: The Real Story behind the Kosovo Numbers Game," AFA Issue Brief, n.p., on-line, Internet, 1 June 2000, available from www.afa.org/library/issues/trueblue.html. By mid-July, General Clark ordered an Air Force Mission Effectiveness Analysis team to go see what was on the ground. General Clark then gave NATO's BDA assessment on 16 September, which was similar to Cohen and Shelton's assessment. The numbers are slightly lower because of multiple strikes, which had previously been double counted. Wesley Clark and John Corley at NATO press conference, Brussels, Belgium, 16 September 1999.

Conclusion

The intent of this chapter was to depict a typical A-10 FAC sortie from briefing to debriefing. The tactics used by A-10 FACs were followed from visual reconnaissance to strike control to target attack. Though fewer than 40 A-10 aircraft were flown over Kosovo, they became the focal point of NATO attacks against the Serbian Third Army. With limited imagery, JSTARS hampered by ROE, and Predator integration in its infancy, A-10 FACs were forced to rely on their own skill and cunning at finding targets, as did the Misty FACs before them. As in North Vietnam, US ground forces were prevented from entering Kosovo to assist in locating and identifying the enemy. The difficulty of positively identifying camouflaged military equipment from 15,000 ft, along with the restrictions on which the targets could be struck, further complicated this already complex mission. Though helpless in keeping the Serbs from systematically expelling Kosovars from their homes, A-10 FACs did stop the Serbs from using their military equipment to do so and ate away at the Third Army's combat capability, as well as the Army's political support for Milosevic's ethnic-cleansing campaign.

The A-10 proved an excellent platform for conducting daylight FAC operations over Kosovo. Trained in the use of space-stabilized binoculars, A-10 pilots could reliably distinguish civilian from military vehicles, isolate valid targets, and control a plethora of NATO strikers.[48] The large quantity and variety of weapons aboard the airframe itself ensured that targets meeting the stringent ROE were attacked and destroyed.

Notes

1. Headquarters USAFE Initial Report, *The Air War over Serbia: Aerospace Power in Operation Allied Force* (Ramstein AB, Germany: USAFE Studies and Analysis, 25 April 2000), 9.
2. Phil Haun, "Airpower versus a Fielded Army: A Construct for Air Operations in the 21st Century," *Royal Air Force Air Power Review,* winter 2001, 74.
3. Christopher Haave and Phil Haun, eds., *A-10s over Kosovo: The Victory of Airpower over a Fielded Army as Told by the Airmen Who Fought in Opertion Allied Force* (Maxwell AFB, Ala.: Air University Press, 2003), 35–36.
4. The western half of Kosovo was code-named NFL.
5. Haave and Haun, 33. The length and number of vulnerability periods increased as additional FACs, including Navy F-14s and Marine F/A-18Ds, arrived in-theater.
6. Only Sandy-qualified A-10 FACs were designated as embedded Sandys.
7. Larry Card, A-10 FAC 74th Fighter Squadron (FS), weapons questionnaire, Gioia del Colle, Italy, June 1999.
8. Haave and Haun, 29–31.
9. Chris Short, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.
10. "Itch" Callich, A-10 FAC, weapons questionnaire, Gioia del Colle, Italy, June 1999.
11. Ibid., 149.
12. Haave and Haun, 32.

13. The squadron also had Canon 15-power, space-stabilized binoculars, slightly larger than the 12-power binoculars. The squadron A-10 FACs were split down the middle on which they preferred to carry.

14. Have Quick II is a jam-resistant, frequency hopping ultrahigh frequency (UHF) radio. In addition, the A-10 has a KY-58 secure radio for its UHF and FM radios.

15. The A-10 has a top speed of 350 KIAS, as compared to the more common 450–550 KIAS flown by other fighters.

16. Haave and Haun, 41.

17. Richard Johnson, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

18. *Weapons File 1999* (Eglin AFB, Fla.: Armament Product Group Manager, January 1999), 2-2.

19. Station six is the centerline station but cannot be used if five and seven are loaded.

20. The A-10 has now been upgraded with a GPS-inertial navigational system.

21. A NATO Airborne Early Warning (NAEW) aircraft looks similar to a US AWACS; however, NAEW does not have the manning, communications suite, or train to control mass strike packages as does AWACS.

22. "Boo" Bullard, A-10 pilot 74th FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

23. Dave Gross, "This Time It's Real," in *A-10s over Kosovo,* 61–62.

24. Wade Thompson, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

25. James Meger, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

26. Pete Brotherton, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

27. Phil Haun, 77.

28. John Cherrey, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

29. Haave and Haun, 34–36.

30. Mark Koechle, "Big Brother" in *A-10s over Kosovo,* 246–47.

31. The Serbs also placed some antiquated tanks out in the open. Since these were real tanks, from altitude it was impossible to distinguish them from more modern tanks.

32. The validity of the artillery pits was confirmed by the NATO mission-effectiveness assessment team, which went to the location after the war and found the destroyed artillery. The team suggested that the late date of the attack did not allow the Serbs enough time to remove the artillery before their departure from Kosovo.

33. These secondary targets, commonly called dump targets, include Serbian Army barracks, weapons storage bunkers, and other fixed Serbian military targets. These targets had been obliterated by the end of the conflict.

34. Germany did not provide strike aircraft but did send ECR Tornados for SEAD support.

35. Phil Haun, "A-10s over Kosovo," *Flight Journal Magazine,* August 2001, 41. The author flew the following strike on 15 April 1999.

36. Pilots from Germany, Belgium, and the Netherlands have little difficulty with English since most already have excellent English skills and many have been through pilot training in the United States.

37. Meger, questionnaire.

38. Cherrey, questionnaire.

39. Michael Shenk, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

40. Joseph Brosious, A-10 FAC 81st FS, weapons questionnaire, Gioia del Colle, Italy, June 1999.

41. *Air War over Serbia,* 15.

42. Daniel Byman, "Kosovo and the Great Air Power Debate," *International Security,* spring 2000, 5.

43. US General Accounting Office (GAO), *Kosovo Air Operations: Need to Maintain Alliance Cohesion Resulted in Doctrinal Departures,* July 2001, GAO-01-784, 11.

44. "Kosovo and Around It: Bargaining Goes On," *Belgrade BETA,* 20 May 1999, n.p. in *FBIS [Foreign Broadcast Information Service] Report,* AU2005123099.

45. The Serbian ethnic-cleansing operations of January 1999, Operation Horseshoe, were so named because of the characteristic formation of Serbian armor.

46. Although A-10 FACs could operate below lower clouds, the necessity for SEAD and jammers on station increased the minimum weather ceiling.

47. Wesley Clark and John Corley at NATO press conference, Brussels, 16 September 1999, n.p., on-line, Internet, 24 February 2002, available from http://www.eucom.mil/operations/af/nato/1999/meabriefing.html.

48. Marty McDonough, "The Call Sign Was Cub 31" in *A-10s over Kosovo,* 175–76. This is evidenced by the 14 April attack on the Kosovar refugee column by F-16CJ FACs. The CAOC called upon A-10 FACs to verify the targets as military. Upon finding tractors and refugees near the destroyed vehicles, the FACs promptly called off the attack.

Chapter 6

Conclusion

Since World War II, the United States has been involved in several limited conflicts against smaller, far less militarily capable opponents. Unlimited war with the Soviet Union, for which the USAF prepared over 40 years never materialized. Instead, US airpower has been directed against underdeveloped, authoritarian states. Such regimes tend to rely upon their armies as their primary source of power. Yet the USAF, born out of the aerial combat experience of World War II, has firmly held to airpower as the means of bypassing military forces and striking directly at the vital center of the enemy. Thus, American airmen are predisposed to discount the effectiveness of air attack against fielded forces. The realities of combat, however, have dictated the need for airpower to attack enemy armies directly without the presence of friendly ground forces. Airmen with little training and doctrine have often had to improvise tactics to fight the war with the resources at hand. This study examined two such groups of airmen in the Misty FACs of Vietnam from 1967 to 1970 and the A-10 FACs over Kosovo in 1999. In both cases, the USAF failed to develop suitable tactics for the direct attack of enemy fielded forces.

Misty FACs in Vietnam

In the summer of 1965, President Johnson became disillusioned with the Rolling Thunder air campaign. The graduated air strikes against North Vietnam failed to force Hanoi to withdraw its support from the Vietcong in the South.[1] Johnson's emphasis instead shifted to ground operations within South Vietnam.[2] The importance of CAS and the interdiction of supplies to the Vietcong was elevated. However, restrictions on lucrative interdiction targets in and around Hanoi and Haiphong Harbor were not lifted.[3] Instead, the USAF was forced to interdict supplies in a piecemeal fashion as they were transported along the Ho Chi Minh Trail.

By early 1967, the efforts of USAF FACs, flying slow-moving, propeller-driven aircraft during the day and AC-47 gunships at night noticeably reduced the supplies to the Vietcong. The North Vietnamese responded to this effort with antiaircraft guns and SAMs, which placed them far south into RP I and forced USAF to stop further FAC operations north of the border. In May 1967, Seventh Air Force launched Operation Commando Sabre, which sent the two-seater F-100F Hun into RP I and Laos on single-ship VR/SC missions.

By the call sign of Misty, these Fast FACs carried out their daylight missions under the constant threat of North Vietnamese AAA. Their four-to-

five-hour sorties were exceptionally dangerous with loss rates three times as high as those of other F-100 missions.[4] With limited intelligence support, Misty FACs conducted visual reconnaissance of the LOCs and AAA positions and generated their own intelligence on the enemy order of battle. The experience from RP I enabled Misty FACs to locate targets that other pilots could not. Misty FACs then controlled fighters onto the targets they found. Using simple, manual bombsights to drop unguided bombs, the strikers were often effective against such soft targets as trucks but lacked the accuracy to take out the hardened AAA sites. In SAR operations, Mistys' in-depth knowledge of air defenses in RP I and their skill in strike control allowed them to suppress enemy ground fire (in support of A-1 Sandys and HH-3 Jolly Green rescue helicopters).

The North Vietnamese responded to the Misty FACs by hiding their vehicles during the day and moving only under the cover of clouds and darkness. Commando Sabre Operations shut down daytime traffic in southern North Vietnam until the bombing halt in November 1968 and then in Laos until May 1970. At that point, a shortage of jets and experienced pilots and the impending withdrawal of F-100 units led to the termination of the program. However, the overall success of the Misty program was recognized by Seventh Air Force in its decision to continue Fast-FAC operations with the F-4 Phantom until the end of the war.

A-10 FACs in Kosovo

On 24 March 1999, NATO commenced air strikes against Serbian military posts and C^2 facilities in an attempt to force Milosevic to accept the Rambouillet Peace Agreement. Milosevic responded by accelerating ethnic-cleansing operations in Kosovo. Within days, hundreds of thousands of Kosovar Albanians had abandoned their homes and overwhelmed the borders. Under intense political pressure to stop the ethnic cleansing, Supreme Allied Commander Clark, ordered air strikes against Serbian-fielded forces in Kosovo.

The high risk of collateral damage arising from the close proximity of Serbian troops to Kosovar refugees compelled NATO to adopt stringent positive target-identification criterion. The use of airpower was further complicated by restrictive ROE and the lethal threat of Serbian MANPADS and AAA, which kept aircraft above 15,000 ft.[5] When President Clinton publicly ruled out the use of US ground troops, the Serbian Third Army freely dispersed its forces throughout the country as it no longer had to worry about defending the borders from a NATO ground invasion. Finally, poor weather over Kosovo continued to impede US air strikes through mid-April.

The mission of attacking the Serbian Third Army was assigned to A-10 FACs who served as mission commanders for day strike packages.[6] With protection from Serbian SA-6s and MiG 21s by SEAD and air-to-air CAPs, the A-10s circled over Kosovo and located Serbian positions with space-

stabilized binoculars.[7] The heavily armed A-10s then attacked and controlled NATO fighter attacks on Serbian armor and artillery. Unlike Vietnam, the targets that the A-10 FACs identified were easily destroyed with a variety of precision-guided weapons, as well as with freefall munitions dropped with the aid of highly accurate computing bombsights.

A-10 FACs received little intelligence from higher headquarters to aid in operations.[8] Imagery was often outdated by the time it reached pilots. Despite the capability of JSTARS to track vehicles with its all-weather MTI, it was unable to differentiate tanks from tractors. While Predator UAVs could identify individual targets, they had never previously trained with FACs, which made them difficult to integrate into FAC packages. As with the Mistys, A-10 FACs were often forced to locate targets on their own. As the weather continued to improve in May, A-10 FAC strikes intensified and gained further momentum as the KLA's offensive in western Kosovo pressured Serb forces out of hiding. A-10s continued to control the skies over Kosovo until early June when Milosevic relented. Upon his acceptance of the Rambouillet agreement, NATO ground forces entered Kosovo and took control.

Lessons from Misty and A-10 FAC Operations

When drawing lessons from previous conflicts, one must approach the task with caution. The temptation to prepare to fight the last war is as real today as it was in post–World War I France when they decided to build the Maginot Line. The examination of these two case studies can help reduce such a risk. Much value can be gleaned from studying the experiences of the Misty and A-10 FACs by focusing on the common challenges they faced in attacking enemy ground forces. Also notable are the factors and policies that restricted operations in Vietnam but which were overcome in Kosovo. However, contextual variables such as weather, terrain, and political constraints cannot be ignored when making this comparison. In both North Vietnam and Kosovo, airpower was called upon to attack enemy forces directly without the benefit of friendly ground troops to locate, identify, and fix the enemy's position. Given the propensity of the United States to task airpower with such a challenge, the USAF should properly train and equip for these operations.

Misty and A-10 FACs demonstrated skill and cunning in engaging the enemy in a way that tightly controlled fighters and bombers could not. These warriors of the modern air age were told to find and destroy the enemy. They were not told how to fight their war but were given, to varying degree, the flexibility to develop and adjust tactics against a thinking adversary. Allowing these guardians of the skies the freedom to fight—as they deemed most effective—was the single most important factor in their success.

Attacking the enemy involves three phases: target identification, weapons employment, and damage assessment. Target identification and damage

assessment require similar intelligence skills and methods: trained and experienced FAC and strike aircrew with onboard sensors to identify and assess targets, and ISR equipment and personnel must be capable of collecting, analyzing, and disseminating information that is still useful by the time it reaches the battlefield. Weapons employment depends on the training and experience of aircrew, the combat loads of strike aircraft, the accuracy of the weapons-delivery systems, and the precision and lethality of munitions. For the USAF to become more successful in this mission, it must be able to identify and assess targets and employ weapons better both day and night, in all weather, in any terrain, and from any altitude.

A key improvement from Vietnam to Kosovo was that of the maturation of precision-guided munitions as well as the development of accurate medium-altitude weapons-delivery systems. This action solved the problem of killing mobile enemy armor *once identified*. LGBs, Mavericks, and even such freefall munitions as CBU and general-purpose bombs can be effectively employed day and night at medium altitude. Nevertheless, all-weather weapons employment against mobile targets remains a challenge for US airpower. While B-2s dropped GPS-guided bombs against fixed targets in Serbia, none were directed at Serbian fielded forces. Subsequent to Kosovo, US tactical aircraft have been fitted with GPS-guided munitions, which may provide a partial solution for all-weather capabilities.

While work on weapons employment certainly needs to continue, the real weakness of airpower lies not in weapons employment but in target identification and assessment. The following discussion covers urgently needed improvements in equipment, training, and doctrine that are required for the USAF to defeat an army more effectively.

Issues of Target Identification and Damage Assessment Equipment

The following four recommendations address the most serious shortfalls in target identification: onboard target identification systems for FAC and strike aircraft, all-weather target identification, integration of UAVs with conventional strike forces, and an intelligence infrastructure able to access, filter, and distribute ISR products quickly. Gains made in any of these four areas will increase the overall efficiency of air operations.

- Misty and A-10 FACs demonstrated that fighter pilots equipped with as little as commercially available cameras and binoculars could locate the enemy with their own skill and cleverness. However, the *onboard target identification capability of airborne FACs and strikers should be upgraded with advanced optical and IR targeting systems*. Such systems are needed to permit both day and night medium-altitude operations. *These upgrades should be given higher priority than that given to weapons and weapons delivery upgrades*. It makes little sense for the

USAF to upgrade its aircraft to drop better bombs until it can first locate and identify targets to be struck.

- The ability to identify valid targets in all weather conditions will continue to be one of air operations' greatest challenges. Though JSTARS cannot effectively differentiate between civilian and military vehicles, its SAR and MTI do provide an all-weather capability. JSTARS could prove decisive in conflicts where the risk of collateral damage is not great. *Continued SAR/MTI research and system upgrades are warranted in the face of all-weather target identification challenges.*
- One of the heroes of Kosovo was the Predator UAV with its ability to positively identify Serbian troops. Furthermore, the more recent use of Predators armed with Hellfire missiles over Afghanistan demonstrates an aggressive effort by USAF to use UAVs in a more offensive role. *Fully integrating UAVs into strike packages will improve the ability of the USAF to capitalize on the real-time identification capability of these surveillance assets. Much work needs to be done in the areas of target marking and radio and identification friend or foe equipment upgrades.*
- Misty and A-10 FACs operated with little outside intelligence in locating targets. Additional emphasis is needed on expediting quality ISR products to the tactical war fighter. *Air Force intelligence organizations must continue to develop a robust digital network that allows immediate access to a variety of ISR assets. Intelligence personnel could then more swiftly filter, process, and forward information through joint/coalition channels.* This system must be compatible with all available ISR assets, including national assets, joint, and combined ISR systems.

Issues of Training and Tactics

The USAF needs to adjust its training and tactics to prepare its airmen to attack armies more effectively. An air force that does not train or develop such tactics will not have the requisite skills when confronted with combat. The adage of "fight the way you train" is true from two perspectives. First, it makes sense to take those tactics and techniques honed during peacetime into combat. Second, a more subtle implication is that military forces have no other option but to fight the way they train. It is training that develops the tactical skills and mind-set that defines a combat force's capabilities. Two recommendations, if heeded, should improve US airpower's ability to strike ground forces: incorporate the direct attack of fielded forces into major USAF exercises and adjust Air Force Tactics, Techniques, and Procedures (AFTTP) 3-1 series publications to include this mission.

- *Major exercises such as Red Flag, Air Warrior, and Cope Thunder should incorporate the direct attack of fielded forces as a primary mission.* Conventional air forces need continuous peacetime exposure to the mission to become familiar with the challenges and skills required to meet

it. *Along with FAC strike packages, these exercises should incorporate Predator and JSTARS ISR platforms into conventional strike packages. Likewise, intelligence systems need to be exercised not simulated.*

- The Air Force should address current shortfalls in tactics through its AFTTP 3-1 series publications to introduce a systems approach for attacking fielded forces. Currently, the tactics that have been developed are found in specialized volumes for each platform. *A separate volume on the direct attack of fielded forces should be developed to focus on the integration of US and coalition ISR, intelligence, C^2, FAC, and strike assets.*

Issues of Doctrine

Current Air Force doctrine is written with the underlying assumption that air strikes against fielded forces will be in support of land operations. However, the direct attack of the Serbian Third Army was neither in preparation for nor in support of ground forces. Joint and Air Force doctrine must adapt to the reality of how US airpower is now being employed. The following two changes to USAF Counterland doctrine should help clarify this shift in the application of airpower: reclassify Counterland missions under direct and indirect attack and redefine FAC.

- USAF and joint doctrine acknowledge two Counterland missions: AI and CAS. Both of these missions are defined by their relationship to friendly forces.[9] *Counterland should be regrouped into direct and indirect attack. Direct attack is the use of airpower against an enemy's fielded forces.* CAS is a subset of direct attack, which acknowledges the detailed integration required should friendly forces be in close proximity to the enemy. *Indirect attack is the use of airpower against an enemy's military potential before it can be fielded.* AI is a subset of indirect attack, whereby airpower is used against enemy's assets before they can be brought to bear against friendly forces. It makes more sense to discuss Counterland in terms of direct and indirect attack than to discuss the current doctrine, which ties these missions to the presence of friendly ground forces.

- Current Air Force doctrine defines the airborne FAC only within the CAS mission: "A specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The forward air controller (airborne) is normally an airborne extension of the tactical air control party."[10] This definition does not acknowledge the role of the Misty and A-10 FACs in conducting visual reconnaissance and BDA. *Forward Air Controller should be redefined in AFDD 2-1.3 as: A specifically trained and qualified aviation officer who performs visual reconnaissance, exercises strike control,*

and conducts battle damage assessment for aircraft engaged in the direct and indirect attack of enemy ground forces.[11]

Concluding Observation

A comparison of the Misty and A-10 FAC missions clearly demonstrates a failure of the USAF to develop suitable tactics for the direct attack of enemy-fielded forces. USAF will continue to be called upon to attack armies without the presence of friendly ground troops to provide targeting. Although quantum leaps in weapons-delivery accuracy from Vietnam to Kosovo now make it possible to destroy armor and artillery from the air, there has not been a corresponding improvement in airborne target identification. Until USAF prioritizes the direct attack of ground forces and target identification, its ability to attack such forces effectively will remain an illusion. Misty and A-10 FACs were resilient warriors who overcame many obstacles by sheer determination and tactical innovation to root out the enemy and get the job done. To draw from their lessons, the recommendations presented here focus on equipment, tactics and training, and doctrine. However, airmen should understand that there is no silver bullet for the challenge of target identification. No single piece of equipment or advance in technology will solve the problem. Airmen must first develop the proper doctrine and tactics, then take their equipment and train as realistically as possible. Only then can USAF reach its potential for defeating an enemy army in the field.

Notes

1. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), 60.

2. John Schlight, *The War in South Vietnam: The Years of the Offensive, 1965–1968* (Washington, D.C.: Office of Air Force History, 1988), 33.

3. William W. Momyer, *Air Power in Three Wars* (Washington, D.C.: Office of Air Force History, 1985), 184.

4. History, 37th Tactical Fighter Wing, January–March 1969, vol. 2, 21.

5. This restriction was later relaxed to allow lower altitudes for conducting visual reconnaissance or diving weapons delivery passes.

6. F-16CG FACs served as the primary night FACs because of their targeting pods.

7. Serbian targets included a wide range of equipment: tanks, armored personnel carriers, self-propelled artillery, towed artillery, AAA guns, two- and one-half ton military trucks, command posts, and SAMs.

8. Phil Haun, "Airpower versus a Fielded Army: A Construct for Air Operations in the 21st Century," *RAF Air Power Review,* winter 2001, 77. The Serbian Third Army ground order of battle was not even compiled at the combined air operations center until the flexible targeting shop was set up within the C-2 intelligence division in May 1999.

9. Joint Publication 3-0, *Doctrine for Joint Operations*, 1 February 1995, GL 3-4. Air interdiction is defined as operations conducted to destroy, neutralize, or delay an enemy's military potential before it can be brought to bear against friendly forces. Close air support involves actions by aircraft against hostile targets in close proximity to friendly forces requiring detailed integration.

10. Air Force Doctrine Document 2-1.3, *Counterland,* 27 August 1999, 93.

11. Ibid., 54. A benefit of the expansion of this definition would be the removal of the Killer Scout from Air Force doctrine. The Killer-Scout role has two key weaknesses that limit its effectiveness. Killer Scouts do not limit the potential of collateral damage as they are untrained in positive air strike control. Killer Scouts also become ineffective once friendlies are involved because they are untrained in CAS.

Airpower versus a Fielded Force

Misty FACs of Vietnam and A-10 FACs of Kosovo—A Comparative Analysis

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