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THESIS

THE FALLACY OF SINGLE SOURCE FIRE SUPPORT

by

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June 2003

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THE FALLACY OF SINGLE SOURCE FIRE SUPPORT

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Submitted in partial fulfillment of the
requirements for the degree of

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This thesis examines the reliance on air power for fire support by light forces and whether other fire support assets could perform these missions better. By studying the historical evolution of fire support, air power and small wars doctrine, patterns emerge in how these developments interrelate. These patterns have led to a system that does not take advantage of some of the capabilities of other fire support assets, mainly artillery and mortars. The case of Operation Enduring Freedom, in Afghanistan, highlights how light forces have come to depend on airpower. Could other forms of fire support have provided coverage that would have been more effective than the air support received? Light forces need to be aware that they have more choices for fire support than calling in air strikes and that artillery and mortars provide capabilities that air power cannot currently duplicate. Afghanistan demonstrated that artillery remains relevant. In a very permissive environment with few competing missions, there were times when air power could not provide the needed fire support to the ground maneuver forces.

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I. INTRODUCTION

“You should not have any special fondness for a particular weapon, or anything else.”

-Miyamoto Musashi, 1643¹

Over the last 100 years, the United States has become more and more dependant on air power. After every war fought in the Twentieth century, air power advocates argued that air power dominated over other military forces. Brigadier General Billy Mitchell and General Giulio Douhet pioneered the development of air power theory after World War I. Douhet and Mitchell were vindicated during World War II. From the German employment of dive-bombers to the Allied strategic bombing campaign, World War II again and again reinforced the value of air power in conventional war. The lessons learned from World War II validated the belief that command of the air and overwhelming firepower were critical for victory. As Robert Scales stated, “bombing and shelling from great distances have proven to be the most efficient and cost effective means of delivering explosive power while avoiding direct, bloody contact with the enemy.”²

In 1991, the Gulf War once again demonstrated that command of the air was a prerequisite for victory in conventional conflicts. For the first time ever, in 1998, NATO compelled Yugoslavia to accept a settlement to the civil war in Kosovo through the use of airpower. NATO’s air campaign degraded Serbian morale and provided the Kosovo Liberation Army (KLA) with freedom from Serbian attacks. Airpower has many advantages: including tactical mobility, mass and precision, which make airpower the preferred choice for military commanders. As a result, American military commanders have begun to depend on the availability of overwhelming airpower and are hesitant to act without it.

¹ Miyamoto Musashi, *The Book of Five Rings*, Translator: Thomas Cleary (Boston: Shambhala Publications, 1993), 14

² Robert H. Scales Jr, *Firepower In Limited War* (Washington, DC: National Defense University Press, 1990), 5

At the same time that air power has begun to dominate conventional conflict, the use of overwhelming air power has failed to prove decisive in limited warfare. In the Korean War and the Vietnam War, the United States sought to overwhelm the enemy through the application of massive amounts of firepower. Because of the distances involved and the remote, inaccessible locations where the fighting took place in many of America's recent limited conflicts, much of the firepower utilized came in the form of aerial bombardment. This choice to rely on airpower has been reinforced in recent deployments to Bosnia and Somalia by restrictive rules of engagement for employing fire support. As part of the 'Afghan' Model of warfare, proponents claim that small forces on the ground can succeed in combat through the exclusive use of air support as a source of fire support.³ Dr Biddle, in his paper examining the effectiveness of the 'Afghan' Model, examined the battles at Tora Bora and Operation Anaconda and found that air support could not dislodge or destroy the Al Qaeda and Taliban forces defending during the battles. The air strikes suppressed the Taliban and Al Qaeda forces while they took place, but when the air strikes ended the enemy forces were no longer suppressed. As a result, the Special Forces operating on the ground encountered limits to the effectiveness of airpower. The failure of airpower to enable the United States to dominate limited warfare raises the questions of how and why airpower does not achieve the same dominance experienced in conventional warfare and could other fire support systems provide better support to the ground forces engaged in limited warfare?

My objective is to examine whether other fire support assets, specifically mortars and artillery, would have been as limited in effectiveness as airpower or of greater application in certain environments. The question I seek to answer is whether there are strengths that mortars and artillery can provide to light forces engaged in limited combat that airpower alone cannot provide. What changes in the employment of fire support systems are needed to increase the effectiveness of fire support to the maneuver commander in specific environments?

³ Stephen Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy* (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2002), 1

To answer these questions, I intend to examine the evolution of U.S. fire support, airpower theory and operations in limited or unconventional wars. How these three factors interrelate explains the underlying reasons for how U.S. forces employed fire support in Afghanistan. The twentieth century saw revolutionary changes in all three areas. The final ten years of the twentieth century, since the Gulf War, has proved especially important, because the soldiers fighting in Afghanistan directly experienced and learned from this period.

American fire support doctrine has evolved significantly in the last hundred years. At the end of the 19th century, the United States military used artillery and mortars using direct fire to support its cavalry and infantry. Direct fire consists of seeing and directly aiming the mortar or artillery piece at the target. The American Civil War and the Russo-Japanese War led to the birth of indirect fire, because the development of infantry rifles resulted in infantry being able to engage artillery units providing fire support with effective rifle fire. To avoid return fire, the United States began to mask its fire support assets behind intervening terrain and use indirect fire to continue to support the infantry and cavalry. Since the mortars and artillery could no longer see and engage their targets directly, accurately engaging targets became more challenging. To enable the guns to hit their targets, forward observers began to take an active part in providing fire support. This significantly improved artillery support during World War I, but fire support proved inconsistent when used during fluid battles of maneuver. In the inter-war years fire supporters employed radios and revised fire direction procedures to improve the responsiveness and accuracy of indirect fire. At the same time, the size and range of mortars and artillery pieces increased, increasing the amount of firepower that could be used against a target. From World War II through the Gulf War, mortars and artillery continued to get heavier with better accuracy and increased range. Mobility increased during this period by mounting the weapon systems on self-propelled vehicles. The evolution towards heavy self-propelled systems resulted in a decreasing reliance on towed artillery except in various light infantry forces and in the Marine Corps. In the 1980s and 1990s, the Field Artillery Branch fielded the Paladin Howitzer system and began developing the Crusader Howitzer in the belief that heavy mechanized forces

would fight future conflicts conventionally. Since the United States possesses an overwhelming conventional force capability, few nations will choose to challenge the United States in conventional warfare. As a result, heavy self-propelled artillery systems will become increasingly irrelevant except to deter other nations from building large conventional forces. Since the Field Artillery Branch dedicated a large portion of its political capital to the Crusader system, many people view the branch as not relevant to the future of the U.S. Military. As a result, the United States Army's Field Artillery has a perception problem, despite having developed numerous capabilities for providing fire support.

In less than 100 years, aircraft have gone from interesting 'oddities' used for observing and reconnaissance to the premiere system for delivering firepower. Primitive bombers were developed in World War I, but they could only engage relatively static targets. From his experiences in the Great War, General Giulio Douhet wrote *The Command Of The Air*, which developed his theories on the employment of airpower.⁴ World War II validated Douhet's theories on the importance of airpower. The United States preferred to employ strategic bombing in an attempt to bring its enemies to their knees. There was significant friction between the Army Air Corps and the ground forces during World War II in regards to providing ground support. This competition stemmed from the debate over whether the Army Air Corps should be its own separate service. After the Army Air Corps became the Air Force, there continued to be some friction between the Army and the Air Force over control of air assets. The Air Force placed the close air support mission behind its air superiority and air interdiction missions. The air superiority and air interdiction missions have strategic implications, while close air support does not. Providing close air support in Korea detracted from the strategic operations that the Air Force sought. In the early 1950s, the Air Force worked to become the dominant service by creating Strategic Air Command (SAC) and being the lead service involved in nuclear war fighting. The strategic implications of nuclear warfare minimized the role that ground forces played. Strategically, ground forces were only relevant in limiting a war between the superpowers from becoming an all out nuclear

⁴ Giulio Douhet, *The Command Of The Air*, Translator: Dino Ferrari (Washington, DC: Office of Air Force History, 1983)

exchange. Once a nuclear exchange began, it would be fought between the air forces and ground combat would be largely irrelevant. During the Cold War, this view dominated SAC's view of warfare. With the end of the Cold War, the risk of a global nuclear war receded, which reduced the importance of SAC. In order to retain its standing, the Air Force sought to expand its roles in limited wars. This fit nicely, because without a counterbalancing force after the Cold War, the United States became increasingly involved in numerous limited wars.

The United States has a long history of involvement in limited wars. Limited wars are conflicts where at least one nation seeks to limit the scale of the fighting, which . Nations limit the scale of a conflict by either employing minimum amounts of force needed to fight or by restricting the scope of the conflict to a certain area. This often results in the war becoming protracted. The United States fought a limited war in Korea by refusing to attack Chinese staging areas and logistics lines in Manchuria. Because limited wars are often restricted in geography, both sides are able to establish safe areas, where their forces can rest and reconstitute. Another way a war can be limited is if the strengths of the opposing forces are asymmetric. In this case, the stronger power has the incentive to use economy of force, one of the nine principles of warfare according to American doctrine, to keep the cost of the war below the value of the expected benefits from the conflict. During the 19th century, the United States fought numerous conflicts to maintain open trade around the world. Often the United States employed military force in limited conflicts to achieve its national objectives. The United States deployed gunboats to China to protect its citizens and the U.S. Navy proved instrumental in opening trade with Japan. In the early part of the Twentieth century, the U.S. Marines deployed on numerous occasions to Central America to enforce U.S. policy. With the development of nuclear weapons, the United States government sought to limit any conflicts it fought because of the dangers of uncontrolled escalation. This led to with the American way of war.

Historically, America used firepower to reduce the number of casualties sustained in past conflicts. The threat of nuclear weapons restricted how much the United States

could escalate a conflict. The United States in Korea and Vietnam sought to contain the fighting to a specific geographical area. Since the fighting was contained to a specific area, the number of strategic targets for the Air Force was limited. The Air Force provided a lot of support to the ground forces, because there were not a lot of competing missions. Also, the United States deployed large conventional formations to the fighting, which allowed the conventional units to bring their organic fire support assets to the conflicts. The invasions of Grenada and Panama in the 1980s followed this pattern of using both airpower and organic assets to provide fire support for the maneuver forces.

The 1990s saw numerous changes in how the United States fought limited wars. The end of the Cold War decreased the importance of SAC, making Air Force assets available for other missions including close air support. The United States could employ military force without being counterbalanced by the Soviet Union, which lowered the risks the United States took when employing military force in limited conflicts. This resulted in the United States becoming involved in more limited conflicts than it had participated in during Cold War. The victory in the Gulf War showcased the overwhelming capability of airpower to support a ground offensive. The Army's Field Artillery Branch identified some of the shortcomings in its support for maneuver forces during the Gulf War, which led to the development of the Crusader artillery system. The Crusader was designed to be able to support the United States Army's heavy mechanized divisions. After the Gulf War, the United States became involved in many limited conflicts around the world. Air power became the system of choice when the United States employed military force. Whether firing cruise missiles at terrorist training camps or bombing Serbian military forces, the U.S. Air Force had the forces available to quickly and accurately carryout the mission. The United States became more and more dependant on airpower for its fire support, while the United States Army's Field Artillery sought to become less relevant to limited wars as it concentrated on being prepared for conventional set piece battles.

These trends were continuing to develop when the United States became involved in Afghanistan after the 9/11 terrorist attacks. The United States initially began bombing

the Taliban regime to achieve the objective of forcing them to withdraw support for Al Qaeda. Within a week, the administration realized that the Taliban would continue to support terrorists and therefore needed to be removed from power. The United States needed the support of the Northern Alliance to eliminate the Taliban and deployed Special Forces teams to support the Northern Alliance. The Special Forces teams operated with the Northern Alliance forces and were supported by air strikes. With the targeting information from the Special Forces teams, the Air Force weakened the Taliban allowing the Northern Alliance and Pashtun insurgents to rapidly take control of Afghanistan. The United States continued to deploy light forces to Afghanistan to search for Al Qaeda personnel. This success was hailed as the 'Afghan' model of warfare; a small unit with air support could defeat larger, more conventional forces.⁵ The small unit did not have to bring its own firepower and could rely exclusively on the fire support provided from the air. Dr Biddle examined numerous battles including, the battles at Tora Bora and Operation Anaconda, and found that air support could not dislodge or destroy the Al Qaeda and Taliban forces defending during the battles once the Al Qaeda and Taliban forces developed countermeasures to the air strikes. The air strikes suppressed the Taliban and Al Qaeda forces, but when the air strikes ended; the enemy forces were no longer suppressed. As a result the Special Forces operating on the ground encountered limits to the effectiveness of airpower.

During the Afghan campaign, air support proved very effective. On numerous occasions the air strikes destroyed Taliban positions lowering the morale of Taliban forces and raising the morale of coalition forces. Without any competing missions, Air Force combat air patrols were almost always available even though aircraft were still restricted by weather and preferred to operate at night. When combined with the newer precision guided munitions, air support proved lethal against exposed Taliban and Al Qaeda positions. At the beginning of the conflict, the Taliban forces were not prepared for the accuracy and destructiveness of U.S. air power. This resulted in the destruction of numerous Taliban forces. Many Taliban fighters when faced with the impressive power of the air strikes chose to change sides and ally themselves with the Northern Alliance.

⁵ Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy*, 1

The size of the Air Force component deployed into Afghanistan was also small because the support assets for the air support were maintained in other friendly countries. This has two advantages: one, the air base is more secure, because it is not near the fighting and two, a single airbase can support multiple countries saving money in construction costs.

As the campaign continued, the Taliban and Al Qaeda forces learned to adapt to the overwhelming airpower. Through employment of cover and concealment, the Taliban avoided being spotted and engaged from standoff distances. Also, the Taliban began to use significant overhead cover under protected overhangs, which protected their defensive positions from being destroyed by aircraft. As fighting progressed, it became evident that destroying a position was far more difficult than suppressing an enemy position. When the air strikes ended, Taliban forces climbed out of their dug-in caves and resumed fighting. This problem was not new. During World War I, German forces hunkered down inside their dugouts waiting for the allies' massive artillery barrages to end. When the barrages ended, the German defenders then returned to their defensive positions, because they knew an attack was coming. This tactic prevented the allied forces from achieving surprise at the tactical level.

Once the enemy forces were alerted to an imminent ground attack, the ground forces had to traverse exposed terrain under enemy observation. The bombs being used by the Air Force were large enough that assaulting infantry had to cross hundreds of meters of open terrain after the air strikes had ended. This gave the Taliban defenders a chance to recover after being bombed. Since mortars have a much smaller burst radius, they can be employed much closer to assaulting infantry, enabling the infantry to assault the enemy position before the enemy has recovered from their suppression. Another old problem that resurfaced was the time it took for aircraft to respond to an air strike request. The time elapsed from a request for an air strike to bombs being dropped took from 26 minutes to several hours.⁶ Against stationary targets, this is good, but if the

⁶ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," interview by Robert H. McElroy, *FA Journal*, ed. Patricia Slayden Hollis, (September-October 2002), 8

targets are fleeting then 26 minutes is too long. Because artillery and mortars belong to the ground commander, obtaining clearance to fire on a target and communicating between the observer and the firing unit are much quicker. Once the Taliban had learned to implement counter measures, the air support became less effective.

Artillery and mortars have capabilities that currently can be exploited to cover the weaknesses of air power. By employing artillery and mortars using non-standard methods, fire support can be utilized to increase the security of the ground forces. The accuracy of mortars and howitzers, when using the five requirements for accurate predicted fire is good enough outside of urban terrain and considerably cheaper than a precision guided munition (PGM). Artillery raids and presence missions are two non-standard missions designed to increase the visibility and coverage of fire support elements. An artillery raid is comprised of a firing unit moving to a forward location to occupy a temporary firing point in order to support another maneuver unit. A classic example of the artillery raid occurred at the Ia Drang Valley battles when a pair of artillery batteries airlifted into LZ Falcon to support the units engaged at LZ X-Ray.⁷

Another non-standard mission developed from the Balkan peacekeeping missions is the presence mission, which is closely related to the artillery raid. The purpose of the presence mission is to visibly occupy a firing position enabling the various factions to observe the operation. The presence mission's objective is to compel opposing factions into complying with the U.S. forces and deter acts of violence by demonstrating the capability to support the U.S. forces. Other non-standard missions developed in the Balkans include employing illumination rounds as marking rounds and smoke rounds as a non-lethal alternative to firing high explosives. The employment of non-standard missions enables mortar and artillery units to operate in a way that improves the visibility and availability of fire support. While airpower, using precision-guided munitions, can deliver more firepower accurately to a target, artillery and mortars provide light infantry formations with unique capabilities that cannot be replicated by massive amounts of airpower.

⁷ Harold G. Moore, *We Were Soldiers Once...And Young* (New York: Random House, 1992), 67

Operation Enduring Freedom became the example of the ‘new’ model of warfare, according to its proponents. The model argues that artillery is obsolete, because air power provides heavier firepower in support of ground forces, is more mobile and is less vulnerable, since it can operate from outside the combat zone. Dr Biddle’s paper challenges this view arguing that the Afghanistan campaign was an example of orthodox theater warfare.⁸ As a test for the continuing relevancy of artillery in limited conflicts, Operation Enduring Freedom proved to be a good test. The new model argues that air support was all that was needed. In Afghanistan, the Air Force had no other competing missions, because the Taliban’s air force and anti-aircraft capabilities had been destroyed by the time U.S. ground forces arrived in Afghanistan. On numerous occasions air power was unavailable or unable to support ground maneuver forces. The large burst radius of the bombs used by the Air Force, limited airpower’s effectiveness to ground forces in close contact with the enemy. Ground commanders still need fire support systems that are under their command to ensure responsive fire support. This demonstrates the continuing relevance of ground based fire support.

At the same time, artillery is widely perceived as becoming obsolete. This stems from the ongoing attempt by the United States Army’s Field Artillery Branch to compete with the U.S. Air Force in providing massive firepower in combat. The cancellation of the Crusader artillery system serves as a reminder that artillery needs to focus more on supporting the maneuver commander and less on competing with the Air Force to provide massive fire support. Prior to the end of the Cold War, the Field Artillery evolved towards providing more firepower. The field artillery community needs to return to its roots and focus on providing better support to the maneuver commander.

⁸ Stephen Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy* (Carlise, PA: Strategic Studies Institute, U.S. Army War College, 2002), 1-58

II. HISTORY OF FIRE SUPPORT

To understand the utility of fire support assets in small wars, an understanding of how American doctrine has evolved must be attained. Beginning with the Industrial Revolution in the late 18th and early 19th centuries and then again in the 20th century, warfare experienced a significant change and then again in the 20th century. Armies grew to massive sizes beginning in the Napoleonic era. This resulted in the development of the staff system capable of enabling military leaders to mold millions of soldiers into an organized force.⁹ The militaries of the powerful nations organized their forces and developed strategies and tactics to fight massive wars.

Major General C.E. Callwell first used the term small wars to describe any wars and operations that were not massive wars.¹⁰ When the massive armies engaged in small wars, they brought with them their strategies and tactics developed for massive wars and employed them in small wars. The U.S. doctrine employed in small wars was adapted from the U.S. doctrine for fighting massive wars. Initially, when the U.S. became involved in a small war, it employed its doctrine for massive wars and then modified the doctrine when weaknesses became apparent. American fire support doctrine followed this historical pattern.

The history of American fire support doctrine developed from the interrelation of three factors: the evolution of field artillery support, the development of airpower and past experience in small wars. The evolution of how field artillery is employed in support of operations established the basic doctrine employed in fire support. The development of airpower affected all aspects of American doctrine and operations. America's past experiences in small wars provided valuable lessons that can be applied to future

⁹ Martin Van Creveld, *Command In War* (Cambridge, Massachusetts: Harvard University Press, 1985), 104-105

¹⁰ C.E. Callwell, *Small Wars*, 3rd Edition (Lincoln, Nebraska: University of Nebraska, 1996), 21

conflicts. All of these factors have affected American doctrine significantly over the last century, but the last ten years have been the most important.

The last decade proved to be the most important, because the American predominance in high intensity non-nuclear combat has forced most nations to limit how they challenge the U.S. military. The Gulf War, in 1991, demonstrated to many nations that challenging the United States in a massive war would lead to the challenger being defeated. Three years after seeing how well America fought massive wars, a Somali warlord forced the withdrawal of American forces from Mogadishu in a small war. Many nations noticed the Somali's success at forcing the U.S. to withdraw from their country and sought to emulate the Somalis. The United States can expect to be involved in limited wars more often as a result.

The United States needs to be prepared to wage these limited wars economically and effectively. The massive application of overwhelming firepower is not economical and historically has not been very effective in small wars. Yet, the United States has come to depend on the application of massive overwhelming firepower to achieve its objectives. The U.S. military has, over time, evolved from using artillery to provide massive fire support to relying on airpower to provide this massive firepower.

A. THE RISE OF FIRE SUPPORT

Before World War I, most fire support was provided by artillery firing directly at the enemy. The development of the repeating rifle provided infantry with the ability to engage artillery units from a much greater distance. Artillery units had to be masked behind terrain features or positioned much further from the enemy to be able to operate without interference. Direct fire consists of seeing the target being engaged, while indirect fire engages a target that is unseen.¹¹ In order to engage an unseen target using indirect fire effectively, the firing unit had to have communications with an observer who could see the target. Often the observer consisted of the firing unit commander. The

¹¹ Boyd L. Dastrup, *King of Battle, a Branch History of the U.S. Army's Field Artillery* (Fort Monroe, Virginia: Office of the Command Historian, 1993), 317-18

commander would either operate with the infantry or, more often, from a hilltop halfway between the guns and the supported infantry.¹² Early in World War I, the forward observers serving with the infantry served as a relay for targeting information. The unit commander operating on the hill separated from the supported infantry unit would often make the tactical decisions. The separation between the tactical decision maker and the supported infantry led to slow response times and poor communication.

As World War I devolved into trench warfare, breaking through the opposing trench lines and suppressing the defenders required massive firepower. To generate the required firepower against the enemy, massive barrages employing hundreds of artillery pieces firing thousands of shells were necessary. To coordinate these barrages, the commanders coordinating the fires operated at extremely high levels, usually corps and division level.¹³ These observation posts often had good communication with the firing units, but encountered difficulties in communicating with the supported infantry. This communication became incredibly difficult when the infantry was attacking or moving forward to exploit a successful attack. To counter this, commanders developed a rigid fire plan detailing where the artillery would fire and for how long. As long as the plan went well, this worked, but if the infantry was delayed or made unexpected progress, the fire plan could not be adapted. Many offensives and attacks failed, because the attacking infantry had no way to coordinate with the artillery. British infantry often became separated from their supporting barrage during the Battle of the Somme in July 1916, which destroyed the synergy the commanders were trying to achieve. The German Alpine Corps found itself blocked by its own slow moving artillery barrage during the Verdun campaign resulting in lost opportunities.¹⁴

Some improvised solutions were developed, but they proved unreliable. Carrier pigeons and messengers might not make it back to the supporting artillery. Smoke and confusion might obscure the signal rockets and semaphore messages. Field telephones

¹² Bruce I. Gundmundsson, *On Artillery* (Westport, Connecticut: Praeger Publishers, 1993), 69-70

¹³ Bruce I. Gundmundsson, *On Artillery*, 71

¹⁴ Bruce I. Gundmundsson, *On Artillery*, 71

were good, but the wire would often be torn-up by enemy artillery and if on the offensive the wire had to laid before it could be used. The communications problems were not solved until reliable radios became available.

In the summer of 1918, during the attack at St. Mihiel, an artillery battery was assigned to directly support and move with each infantry brigade to provide better support. Though the batteries varied in their effectiveness, the infantry commanders appreciated having the increased firepower at their disposal.¹⁵ The horse drawn artillery had difficulties moving across the broken ground and wire entanglements. To increase mobility, the U.S. Army used self-propelled artillery during the St. Mihiel Offensive.¹⁶ Since the artillery was mounted on tractors in an improvised manner, the self-propelled artillery was not decisive in the battle. The self-propelled and motorized artillery proved useful, which led to the war department converting some heavy artillery units from horse-drawn to tractor-drawn artillery.

Though World War I led to the development of mechanized artillery, the use of forward observers and the assigning of artillery to directly support infantry commanders, the key lesson learned in World War I “was that the conflict had been dominated by heavy artillery.”¹⁷ These developments allowed artillery to become part of the combined arms team. Heinz Guderian believed that artillery played an important part in supporting the maneuver commander, the term by which infantry and armor commanders became known.¹⁸ Successful artillery employment during World War I was limited by technical progress. The inter-war years and World War II would provide many of the technical solutions to fire support. Between World War I and World War II, the United States Field Artillery converted most of its horse drawn artillery units to motorized artillery. To solve the communications problem, forward observers received radios to communicate with the firing units. Motorization and the radio enabled artillery units to spread out further and

¹⁵ Dastrup, *King of Battle*, 170-171

¹⁶ Dastrup, *King of Battle*, 174-75

¹⁷ Bruce I. Gundmundsson, *On Artillery*, 107

¹⁸ Heinz Guderian, *Achtung-Panzer!*, Translated by Christopher Duffy (London: Cassell & Co, 1992)

become more mobile. The negative side of the technological advances was that artillery batteries could not mass their fires effectively or quickly.

In the 1930s, the Field Artillery School at Fort Sill, Oklahoma, began to revise how firing data for the guns was computed. In World War I, the observers adjusted each artillery battery onto the target. This was a slow and cumbersome process. In 1931, the director of the Gunnery Department at the Field Artillery School, Major Carlos Brewer developed a new method of massing fires:

Major Brewer concluded that using terrain features or giving “guessed at” coordinates of the targets to the batteries to plot was part of the problem of inadequate close support in 1917-18. Brewer ... revised observation methods, creating a firing chart on which the base point (the target) was plotted, and located battery positions through survey. In the spring of 1931, they used these innovations to mass battalion fire accurately after registering one battery on a target without all forward observers being able to see the target and without maps.¹⁹

By establishing “common” survey between artillery units, multiple batteries could mass their fires accurately and quickly. To organize the firing units, fire direction centers were established at the battalion and battery levels. These centers had the task of computing the firing data instead of the forward observers. The fire direction center took into account the individual piece locations and other special corrections and adjustments. Battalions could now mass fire in ten minutes and batteries could accurately fire on targets within five minutes.²⁰

After observing the success of the German self-propelled artillery in 1939-1940, the United States began to develop self-propelled artillery.²¹ The success of the German army’s Blitzkrieg tactics spurred the United States to develop mechanized and armored forces of its own. The artillery supporting those forces became heavier and longer ranged. The improvement in radio communications led to artillery providing fire support from

¹⁹ Dastrup, *King of Battle*, 197

²⁰ Dastrup, *King of Battle*, 197

²¹ Dastrup, *King of Battle*, 205

longer distances. The eight-inch gun could fire a 200-pound round 35,000 yards.²² Self-propelled artillery also proved its worth during the war by being able to emplace and displace far faster than towed field artillery, which took hours to emplace and displace for some of the heavier towed artillery pieces. This enabled the artillery to rapidly shift positions and mass fires wherever the maneuver commander needed overwhelming firepower.

Reflecting upon the war in Europe, US Forces, European Theater (USFET), concluded late in 1945 that firepower and maneuver were the fundamental elements of combat. The application of firepower preceded successful maneuver to permit the infantry and armor to take objectives without serious loss of life or injury.²³

By the time the U.S. Military fought the Korean War, American servicemen expected that anytime they called for fire support, they would shortly receive massive barrages in response. The static nature of the Korean War enabled the U.S. Army to station large numbers of artillery batteries behind the frontline. This guaranteed that most patrols were within range of friendly artillery.

The importance of artillery in the Korean War contrasted with the peacetime view that artillery was unimportant. In peacetime exercises the artillery's participation was often left to the imagination. As the strategic utility of nuclear weapons became more visible, the value of direct support artillery appeared to decline. The development of tactical nuclear weapons raised the question of the utility of large ground forces because they were vulnerable to nuclear weapons. With the view that massing was no longer important because a single cannon could fire a nuclear weapon, the artillery refocused on providing direct fire support to maneuver units. This was accomplished by attaching a six-to-twelve gun battalion to each battle group of a Pentomic Division.²⁴

²² Dastrup, *King of Battle*, 237

²³ Dastrup, *King of Battle*, 226

²⁴ Bruce I. Gundmundsson, *On Artillery*, 147-149

The Vietnam War forced the U.S. Army to re-evaluate itself and prepare to fight limited wars. Since the insurgents operated in small units, the Viet Cong seldom presented a worthwhile target for a massive army to attack. Thus, massing multiple battalions became less important. To combat an enemy who was weaker than the U.S. Army, the artillery had to be responsive across the entire country. The artillery battalions spread their batteries across the country, stationed at 'fire bases,' to improve coverage. With the vast coverage, artillery's main mission became providing immediate fire support to every infantry patrol that came into contact with the enemy. As the war continued, patrols became smaller and smaller as their mission was to find the enemy and then let overwhelming firepower destroy the enemy. Close air support and the interlocking network of firebases provided the firepower.

Vietnam reminded the United States that nuclear weapons were weapons of last resort and would not be utilized in most conflicts. In spite of the Vietnam experience, the U.S. Army spent much of the 1970s and 1980s preparing for war in Northern Europe with the Warsaw Pact nations. The impact of the preparation for war in Northern Europe affected the design of many of the United States Army's weapon systems. The Apache attack helicopter and many artillery systems were designed for the specific threat presented by the Red Army. The artillery went back to the organizational design from World War II where it prepared to mass on enemy troop concentrations with massive amounts of firepower. Once again the artillery worked to develop the ability to mass fires quickly and accurately.

To mass fires quickly, the drill for artillery crews has been standardized and automated as much as possible. The standardization of each crewman's tasks reduced confusion and ensured accuracy. In the 1980s, the Battery Computer System quickly computed firing data for the battery's eight guns by including corrections for the earth's rotation, the weather, different production lots of ammunition and propellant, the temperature of the propellant and the variations of the cannon tube from other tubes. All of these factors affected the accuracy of the round. By accounting for them, cannons and mortars became very accurate.

The range probable error for the army's 155mm M198 Towed Howitzer at 18,000 meters is 52 meters and the probable error for the 105mm M1A1 at 11,000 meters is 22 meters.²⁵ The burst radius for the 155mm HE round is 50 meters and the burst radius for the 105mm HE round is 35 meters. These probable errors are based on the older tubes; the newer cannons are even more accurate. At the maximum range of the howitzers the rounds will generally have effects on the targets. The U.S. Army developed the Copperhead Laser Guided round to attack moving and pinpoint targets using the 155mm cannon. At the end of the Cold War, development began on the Crusader Artillery System, which was designed to operate in a highly lethal battlefield against enemy mechanized forces.

The speed with which an artillery unit could respond to a call for fire had improved as well. A trained artillery battalion could fire on a target in less than five minutes and a battery could fire in less than two minutes, halving the time from the 1940s. This data is based on the standards for M110s (eight-inch), M109A3s and M198 155mm howitzers. The newer M109A6 Paladins and improved M198 towed howitzers use modern cannon tubes, which are more accurate and longer ranged.

The Field Artillery advanced over the Twentieth century from being useful against relatively large static targets to being able to attack point and moving targets. At the same time, the Field Artillery became heavier and planned to become even heavier with the new Crusader Artillery System. With the end of the Cold War, people's expectations towards how future wars would be fought changed radically.

B. THE ADVENT OF AIR POWER

The invention of heavier than air flight 100 years ago resulted in a revolution in how nations fought wars. Many believe air power to be critically important to victory. Yet, the Vietnamese and Afghans demonstrated that American and Soviet dominance of

²⁵ *FT 105-H-7*, (Washington D.C.: Department of the Army, 20 May 1971), 208 & *FT 155-AM-2* (Washington D.C.: Department of the Army, June 1991), 344

the air did not ensure victory. The evolution of aircraft and the strategy of employing them affected every aspect of the U.S. military. Just as the growth of artillery served as a substitute for committing maneuver forces, air power evolved as a substitute for ground forces with the intent of reducing U.S. casualties.

In World War I, aircraft were not advanced enough to play more than a minor role in support of ground forces. The range and speed of fighters restricted them to operating over friendly areas or just a few miles from the front. The Germans conducted some strategic bombing of England using zeppelins. The zeppelins had a small bomb load and were vulnerable to fire due to the hydrogen gas that filled them. The zeppelins bombed at night from great height to avoid anti-aircraft fire and enemy fighters, which resulted in poor accuracy. “Still, the specter of Teutonic leviathans cruising the night sky miles above the earth and scattering death willy-nilly shook the British public badly,” and threatened support for the British war effort.²⁶ However, British morale held and the zeppelins proved too vulnerable.

At the front, aircraft performed reconnaissance missions. The aircraft observed enemy dispositions and located targets for the ground-based artillery. The bombers of World War I carried small bomb loads, had a limited range and were vulnerable to air defenses. Like the zeppelins, the bombers had an insignificant effect on the outcome of battles and the war. The biggest effect that airmen had on the war was that they captured the public’s attention and were lionized. War in the air gained the reputation of being a civilized contest between modern day knights, while the Western Front degenerated into a hellish world that consumed men. Many viewed air power as a cheap alternative to the costly attrition of the Western Front.

After World War I, numerous theorists began to extol the value of air power at the same time that aircraft improved significantly. The U.S. Army conducted experiments to determine the effectiveness of aircraft. Concentrating in the realm of theory, Giulio Douhet, an Italian officer, wrote about how control of the air would lead to control of the

²⁶ Stephen Coonts, *War In The Air* (New York, New York: Simon & Schuster Inc., 1996), 1

sea and land. He believed that it was impossible to stop a well-organized bomber attack. The bomber force could then devastate the war making capability of the enemy country. Douhet felt that the country that dominated and controlled the air would be the victor in war:

To have command of the air means to be in a position to wield offensive power so great it defies human imagination. ... In short, it means to be in a position *to win*. *To be defeated* in the air, on the other hand, is finally to be defeated and to be at the mercy of the enemy, with no chance at all of defending oneself, compelled to accept whatever terms he sees fit to dictate.²⁷

Because of the dominance of air power, Douhet argued that the ‘Shock and Awe’ of an air campaign would bring the opposing country to its knees.

At the same time that Douhet developed his theories on air power, Brigadier General William Mitchell, an American proponent of air power, demonstrated the importance of air power for the United States. In a 1921 experiment, BG Mitchell bombed and sank the battleship *Ostfriesland*, succeeding where the British main battle fleet had failed at the Battle of Jutland.²⁸ At the Battle of Jutland, the British failed to sink any of the German battleships that they encountered. BG Mitchell became an outspoken proponent for the formation of an air force as a separate branch of the armed services. Major Carl Spaatz also believed that the air force needed to be more than just a supporting arm to ground forces and should operate independently.²⁹ By the 1930s, the Army Air Corps developed a doctrine based on using heavy bombers to conduct precision daylight attacks.³⁰ The Army Air Corps tested this doctrine during World War II.

²⁷ Giulio Douhet, *The Command Of The Air*, Translator: Dino Ferrari (Washington, DC: Office of Air Force History, 1983), 23

²⁸ David Jablonsky, *Roots of Strategy, Book 4* (Mechanicsburg, Pennsylvania: Stackpole Books, 1999), 416

²⁹ Herman S. Wolk, *The Struggle For Air Force Independence* (Washington, DC: Air Force History and Museums Program, 1997), 8

³⁰ Herman S. Wolk, *The Struggle For Air Force Independence*, 18

While the United States was developing a doctrine for strategic bombing, the Royal Air Force (RAF) became involved in numerous struggles with insurgents in the 1930s. Initially, bombing served as an effective and cheap method of maintaining order. As time passed and the insurgents became used to air attacks, the RAF needed to use more and larger air strikes to accomplish the mission. Critics of the RAF accused the RAF “of being callous and indifferent to the casualties it caused.”³¹ An unexpected cost of using air power became the horror one’s own civilians felt as they experienced the suffering being inflicted on the civilian victims of bombing. Douhet and other air power enthusiasts had not considered the costs of collateral damage when developing their theories on air power. During World War II, many justified the cost by arguing that allied cities had already been bombed.

The early experiences of the Army Air Corps in World War II appeared to validate the doctrine of daylight precision bombing. The Battle of the Bismarck Sea took place on 1 March 1943 when over 200 land-based bombers with fighter escorts destroyed an entire Japanese troop convoy. This validated the importance of command of the air because the Japanese never risked large troop transports in regions where the Americans dominated the air space.³² In early 1943 in the European Theater, the Army Air Force (AAF) began to employ its doctrine of daylight precision bombing. These first small missions concentrated on targets close to England and were escorted by fighters. The early missions suffered light losses. This led the AAF’s leaders to believe that massive bombing raids by unescorted bombers could destroy the German war machine with slight losses.³³ Six months later, the Eighth Army Air Force suffered heavy losses during unescorted raids against Germany. This raised questions about Douhet’s theories on the success of strategic bombing. Since the initial perception formed about strategic bombing was positive, the positive perception would hold sway over the leaders even after it had been discredited. Once an escort fighter that could support the bombers for the length of

³¹ Philip A. Towle, *Pilots And Rebels* (McLean, Virginia: Brassey’s (US) Inc, 1989), 53

³² Samuel E. Morison, *The Two Ocean War* (USA: Atlantic-Little, Brown Books, 1963), 273

³³ Jefferey G. Barlow, *Revolt of the Admirals* (Herndon, Virginia: Brassey’s, 1998), 14

its mission was developed, the U.S. returned to trying to destroy the German war effort by an independent air campaign of strategic bombing.

After World War II, the United States conducted a survey of the effects of strategic bombing. The survey found that strategic bombing did not break the morale of the Germans or Japanese and did not lead to civil unrest, which would have caused the two countries to collapse.³⁴ This contrasted with the great damage done to German and Japanese cities by the strategic bombing campaign. The AAF commanders argued that the failure of strategic bombing to achieve its goals resulted from a lack of resources and the diversion of forces to support ground and naval campaigns.³⁵ Had AAF assets and resources not been diverted to supporting ground attacks, AAF commanders believed the strategic bombing campaign could have achieved its objective of forcing the Axis to surrender without the costly ground campaigns. The doctrine of strategic bombing gained credibility with the invention of nuclear weapons. Nuclear weapons enabled a single bomber to inflict catastrophic damage on large areas. The development of nuclear weapons strengthened the argument that bombers can devastate an opposing country's ability to make war rendering expensive land campaigns irrelevant.

Part of the reason the AAF commanders fought so hard for an independent bombing campaign and against the ground support missions stemmed from their desire to become an independent service. The effort to become a separate service gained credibility from having a mission to dominate the air and conduct independent air operations. Although having the mission of supporting ground and sea campaigns supported the argument that an air force should be a subordinate part of the Army and Navy, just as the U.S. Marine Corps was a subordinate part of the U.S. Navy. To become a separate service from the U.S. Army, the Army Air Force had to justify that an air force does more than support ground forces. The Army Air Force won the fight to become a separate service in 1947, becoming the U.S. Air Force. In the consolidation and reorganization of the late 1940s, the U.S. Air Force constantly fought with the U.S. Navy

³⁴ Stephen T. Hosmer, *Psychological Effects Of U.S. Air Operations In Four Wars 1941-1991* (Santa Monica, California: RAND, 1996), 9-15

³⁵ Jefferey G. Barlow, *Revolt of the Admirals*, 21

and U.S. Army about roles and missions to maintain it independence. The U.S. Air Force fought many of these battles with the U.S. Navy over control of specific types of aircraft.³⁶ Since President Truman placed a cap of \$15 billion on the overall defense budget and each of the services felt the budget was too low, the services became locked into a zero sum game for budget dollars. This was a game where budget gains by one service, caused a corresponding loss to the budgets of the other services.³⁷ This competition for a larger budget led to parochialism between the services, which has continued to foster competition between the various services.

Part of the competition has continued to drive the Air Force's continued reliance on strategic bombing over ground support. In both the Korean War and the Vietnam War, strategic bombing advocates believed that a strategic bombing campaign would raise the cost of continued resistance to the point where the North Koreans and North Vietnamese would be willing to negotiate. The North Koreans, their Chinese supporters and the North Vietnamese proved very resilient to coercive bombing strategies. Unfortunately, strategic bombing often failed to compel the United States' enemies in limited wars. Since World War II, the United States seldom has had the will to pay the political costs of unconstrained bombing, when unconstrained bombing could have been used to coerce its enemies. Unconstrained bombing means bombing missions carried out without regard for collateral damage. Our enemies could turn to the Soviet Union for aid to mitigate the costs of strategic bombing and increase the costs to the United States.³⁸

General Mark Clark, after assuming command of UN forces in Korea, authorized "an air pressure campaign that would make the war too costly for the communists to continue."³⁹ Most targets of strategic value in North Korea had already been destroyed and the Far East Air Force (FEAF) was not authorized to attack targets in China and the Soviet Union. The lack of attackable targets limited the effectiveness of the strategic bombing campaign. At the same time, the FEAF suffered losses to Soviet and Chinese

³⁶ Herman S. Wolk, *The Struggle For Air Force Independence*, 163-167

³⁷ Jefferey G. Barlow, *Revolt of the Admirals*, 162

³⁸ Stephen T. Hosmer, *Psychological Effects Of U.S. Air Operations In Four Wars 1941-1991*, 18-101

³⁹ Stephen T. Hosmer, *Psychological Effects Of U.S. Air Operations In Four Wars 1941-1991*, 18

pilots defending North Korea, but based north of the Yalu River in safe areas. With no other useful targets, the Air Force concentrated on conducting air interdiction and close air support missions. Roughly half of all sorties flown in Korea were air interdiction or close air support missions. These missions assisted the UN coalition forces in preventing the North Koreans from conquering South Korea. Since North Korea realized it could not conquer South Korea, the communists chose to negotiate. Air power assisted in compelling the communists to negotiate by preventing them from being able to win. When negotiations dragged on, the U.S. began destroying dams and North Korean rice crops, which forced the North Koreans to resume negotiations when combined with nuclear threats. The successful campaign of air interdiction and combat air support led to the negotiated armistice. The air power proponents claimed the failure of strategic bombing resulted from the limits placed on it by politicians.⁴⁰

During the Vietnam War, politicians once again placed restrictions on the strategic bombing campaign, but this time the strategic bombing campaign failed to compel the North Vietnamese to negotiate. The North Vietnamese were not satisfied with a draw, they wanted to conquer South Vietnam. By manipulating the negotiations, the North Vietnamese were able to minimize the effectiveness of the strategic bombing. The North Vietnamese sent sapper teams to Thailand to attack the bombers on the ground occasionally. While these attacks failed to interfere with the bombing campaign, they highlighted that airbases could be attacked outside of the theater.⁴¹ As a client state of the Soviet Union, North Vietnam received defensive aid, which made bombing missions into North Vietnam hazardous. The pilots, who were shot down over North Vietnam, became one of the biggest bargaining chips the North Vietnamese had against the United States.

At the same time that strategic bombing was failing to achieve decisive results, the air interdiction and close air support missions devastated Viet Cong and North Vietnamese Army (NVA) units. Michael Herr, a war correspondent, reported that B-52s dropped 120,000,000 pounds of bombs in defense of the marine base at Khe San over a

⁴⁰ Stephen T. Hosmer, *Psychological Effects Of U.S. Air Operations In Four Wars 1941-1991*, 18-21 & 99-101

⁴¹ Alan Vick, *Snakes in the Eagle's Nest* (Santa Monica, California: RAND, 1995), 83

three-week period.⁴² The North Vietnamese negotiated a settlement to eliminate the U.S. Air Force's participation in the defense of South Vietnam. When Hanoi launched the Easter Offensive in 1972, the South Vietnamese defeated the attack with massive support from U.S. airpower. The air interdiction, including the Linebacker bombing campaigns, and close air support missions are credited with being an integral part of stopping the Easter Offensive. The close air support and air interdiction missions forced the North Vietnamese to the negotiating table, when strategic bombing failed to achieve this objective.⁴³ The North Vietnamese did not attempt to conquer South Vietnam again until 1975, when the United States could not intervene because of domestic political constraints.⁴⁴

Throughout the Cold War, strategic bombing was part of nuclear deterrence. By threatening the Soviet Union with a nuclear holocaust, the United States successfully deterred the Soviet Union from aggressive action in Europe. Since the United States could not compete with the Soviet Union in manpower, it was thought the U.S. Army could not defeat the Soviet Union in conventional ground combat. The United States increased the size and capability of the U.S. Air Force as a counter-balance to Soviet conventional capabilities. The end of the Cold War left the United States with a huge military capability and no competitor to deter the United States from employing its forces in situations short of vital national interests.

C. THE U.S. INVOLVEMENT IN SMALL WARS DURING THE COLD WAR

During the Cold War, the United States became involved in many small wars. Since the United States and Soviet Union could not settle their differences through direct conflict, both countries used surrogate forces to disrupt the other's sphere of influence. These actions often resulted in the super-powers becoming involved in small wars on the periphery of their spheres of influence. Small wars served as distractions from the U.S.-

⁴² Michael Herr, *Dispatches* (New York, New York: Avon Books, 1978), 155

⁴³ Stephen T. Hosmer, *Psychological Effects Of U.S. Air Operations In Four Wars 1941-1991*, 36-40

⁴⁴ Robert A. Pape, *Bombing To Win* (Ithaca, New York: Cornell University Press, 1996), 204-205

Soviet competition during the Cold War. As a result, every deployment not directly involved in the on going confrontation with the Union of Soviet Socialist Republics (USSR) could be considered a small war. Both Korea and Vietnam qualify as small wars because they distracted the United States from concentrating on its main rival, the USSR. The objective of the super-powers involved in a small war was to minimize the costs of winning the small war.⁴⁵

The United States initially attempted to solve the Korean conflict with a show of force after being surprised by the invasion in June 1950. Many believed that the North Korean's would withdrawal back to the north after they realized the American military had arrived. Initially, the United States committed its forces in a piecemeal fashion to the conflict. When the first battalion task force deployed to Korea commanded by Lieutenant Colonel Charles Smith, their mission was to halt the advance of the North Koreans. Brigadier General John Church told LTC Smith that his task was supposed "to support the ROK's and give them moral support."⁴⁶ By demonstrating that the United States was committed to protecting the Republic of Korea, the United States hoped to avoid committing significant forces to the region. Unfortunately, Task Force Smith failed to prove a credible deterrent to the North Koreans and the United States found itself forced to deploy significant forces to the region in order to roll back the North Korean invasion.

The tragic failure to stem the North Korean invasion forced the United States to commit the Eighth United States Army (EUSA) to Korea. The United States employed maneuver warfare against the North Koreans. By conducting a landing at Inchon, the United States was able to cut the supplies to the North Korean Army and decisively defeated the enemy. The United States continued to use maneuver warfare to pursue fleeing North Korean units and to overrun North Korea. The American doctrine of using maneuver warfare to bypass enemy forces and strike at their logistics base was developed in World War II. General Douglas MacArthur employed this doctrine effectively during the island hopping campaign in the Pacific. The maneuver doctrine proved successful

⁴⁵ C.E. Callwell, *Small Wars*, 3rd Edition, 21 and Paul Kennedy, *The Rise And Fall Of The Great Powers* (New York, New York: Random House, Inc, 1987), 373-395

⁴⁶ T.R. Fehrenbach, *This Kind Of War* (Herndon, Virginia: Brassey's, 1963), 66

against the North Korean Army's mechanized and logistic dependant forces in the more open country of South Korea, but failed when the Chinese committed their Army and fought in the mountains of North Korea.⁴⁷

In November 1950, the Chinese communists, commanding the People's Liberation Army (PLA), joined the fighting in Korea to support and prop up the North Koreans. The PLA mainly consisted of infantry forces with limited logistical support. By attacking in massive human wave assaults along the entire front, the PLA found the seams between enemy units and infiltrate forces in and around the enemy units. The infiltrators enabled the PLA to isolate the units being attacked, cutting off their supply routes. The terrain favored these tactics, because the United States' mechanized forces were road bound while the PLA could operate in any terrain and did not depend on the road network. Despite suffering heavy casualties from United States' air and artillery support, the PLA successfully forced the United States to withdraw below the 38th parallel.

Maneuver warfare proved relatively useless against the PLA's tactics. Since the PLA forces could live off the land, air interdiction and attacks against the supply bases only served to slow the build up of PLA forces at the front instead of stopping them. This was further exacerbated by the PLA's use of camouflage, dispersal, bad weather and night to minimize American attempts at using air interdiction against the supply lines, which met with limited success. Also, once PLA units became engaged with American units, they often became intermixed, which forced the U.S. commanders to choose between accepting friendly fire casualties or limiting the effectiveness of their air and artillery strikes. Artillery proved more useful against human wave attacks, because it could be fired continuously throughout the attack and could be adjusted in very close to friendly positions. The 3rd Battalion, 38th Infantry held a position named Bunker Hill by having the division artillery fire variable time (VT) artillery, a method of causing airbursts, onto its own positions. Since the Americans were in bunkers and the attacking

⁴⁷ T.R. Fehrenbach, *This Kind Of War*, 1-355

Chinese and North Koreans were exposed, the artillery annihilated the attackers while the defenders remained safe in their bunkers.⁴⁸

As the United States and UN forces continued to build up in Korea, the United States eventually reduced the threat of infiltration by tying the flanks of each unit together and stretching the line of control across the peninsula. Once the line extended across the length of the peninsula, combat settled into a static war of attrition, where each side tried to make the cost of continued fighting excessive. After it became apparent on 30 June 1951 that a negotiated peace would end the war, rather than the defeat of the North Koreans, the United States began to use firepower as a substitute for sending soldiers into close combat to limit the war's cost. The mission of the infantry was to find and fix enemy forces, so they could be destroyed by air and artillery strikes. The United States continued to use this tactic until the war ended.

This evolution of substituting firepower for ground maneuver forces continued in Vietnam. The dense jungles of Vietnam restricted maneuver, limiting ground forces to the speed of their feet. To offset the inability to maneuver, the United States employed firepower to dominate parts of the battlefield they could not reach by maneuver. The United States also used helicopters to transport forces over the jungle, but while this increased the mobility of our forces, it did not increase their control of the battlefield. This reinforced the utility of firepower over maneuver.

While commanding the 1st Infantry Division in Vietnam, General William DePuy discovered that most U.S. casualties came from close combat and mines, while the majority of enemy casualties stemmed from artillery and air strikes. He believed the way to minimize friendly casualties and maximize enemy casualties was to send smaller infantry forces out to find and fix enemy forces, which could then be destroyed by massed air and artillery strikes.⁴⁹ This proved effective in destroying enemy forces, but did not facilitate seizure of terrain. The communists were eventually able to replace the

⁴⁸ T.R. Fehrenbach, *This Kind Of War*, 333

⁴⁹ Robert H. Scales Jr., "From Korea To Kosovo", *Armed Forces Journal International* (December 1999), 37

men and material destroyed by the U.S. and its allies over time. The United States made the mistake of basing their strategy on attrition, but leaving the enemy with the initiative. The enemy could set the tempo of operations by increasing or decreasing the tempo to their advantage.

Since much of the fighting took place in thick jungles, there was little danger of collateral damage. This enabled the United States military to be unconstrained when it employed massive air and artillery strikes. Rather than engage enemy units, the United States employed B-52s to drop massive quantities of bombs on suspected enemy positions. The Viet Cong and North Vietnamese forces that faced this unprecedented onslaught suffered grievous casualties. The Viet Cong and North Vietnamese learned to mitigate the effects of air and artillery strikes by becoming masters of camouflage and unseen movement. The enemy often used tunnel networks to move and organize forces, which were invulnerable to American airpower.⁵⁰ They dispersed as much as possible and only massed together to present a good target when in the vicinity of American and South Vietnamese units. This tactic forced the Americans to choose between risking friendly casualties from air strikes or foregoing the air strikes and facing the enemy on more equal terms. While massive firepower degraded the enemy's forces in the field significantly, it failed to force the enemy to sue for peace.

The United States learned from Vietnam that protracted wars can be very costly and it wrongly learned to use firepower instead of maneuver. By focusing on destroying enemy forces, the United States never questioned if an attrition based strategy was the optimal solution. Instead the United States concentrated on developing ways to deliver more firepower onto the enemy and to improve its accuracy. By improving the accuracy, the United States reduced the cost of fighting by employing less munitions and delivery systems. While having an advantage in firepower over the communist forces made the war more costly for the North Vietnamese, the North Vietnamese were more willing to pay the price. To avoid being caught in another endless quagmire, U.S. military learned that wars must be short and decisive to ensure public support.

⁵⁰ Tom Mangold and John Penycate, *The Tunnels Of Cu Chi* (New York, New York: Random House Inc., 1985)

The United States became involved in one final limited conflict in Southeast Asia in May 1975. On May 12, 1975, Cambodia seized the freighter *Mayaguez*. A rescue force composed of U.S. Marines covered by U.S. Air Force fighters attempted to rescue the crew, who the U.S. thought were being held on the island of Koh Tang. As the rescue mission began, an orbiting AC-130 gunship departed the area and the fighters tasked to cover the air assault refueled from their tanker, resulting in the air assault hitting a hot landing zone without any fire support. Coordination between the marines and the pilots continued to suffer until late in the rescue mission, when an airborne forward air controller in an OV-10 Bronco took control of the close air support. Prior to the arrival of the OV-10 Bronco, the pilots coordinating the air strikes continuously changed as the pilots ran low on fuel and had to depart the area to refuel from airborne tankers. At one point the air force dropped a BLU-82, the largest non-nuclear bomb the air force owned, which the forces on the ground thought were the supplies they had requested. The BLU-82 is dropped from a C-130 cargo aircraft using a parachute, which explains why it was mistaken for a requested resupply bundle. The ground commander had requested to be notified before any large bombs were dropped, but the first warning came when the bomb exploded 800 meters away from friendly troops. The inability to control the air strikes from the ground until a forward air controller arrived resulted in heavy casualties for the rescue force.⁵¹

Throughout the Cold War and in the limited wars fought during the Cold War, the United States often faced an opponent with the availability of a larger pool of manpower. To counter these larger forces the United States had to either outmaneuver the enemy or employ more firepower to achieve victory. The restricted terrain in Korea and Vietnam supported firepower over maneuver. This preference for firepower was further supported by the American penchant for technical solutions. The United States made great advances in the application of firepower during the Cold War, but it failed to learn to integrate the firepower with maneuver in limited conflicts.

⁵¹ Lucien S. Vandenbrucke, *Perilous Options, Special Forces As An Instrument Of U. S. Foreign Policy* (New York, New York: Oxford University Press, 1993), 94-113

D. THE POST-COLD WAR ERA

Once the Cold War ended, the United States no longer had to contend with the USSR. This coincided with a technical revolution in computing. The end of the Cold War changed the strategic situation the United States faced. By the time that the Soviet Union collapsed, the United States had built up a huge air force to fight it. The U.S. Air Force had to find new rolls and missions because the old mission of deterring the Soviet Union no longer required such a massive air force. The Air Force became involved in power projection as a new mission.⁵² While the end of the Cold War left the United States in a position of unrivaled power, similar to the United States' position after World War II, the United States had to reduce its military expenditures. During the first half of the 1990s, the United States Army shrank from 18 combat divisions to 10 combat divisions. At the same time, the Army has deployed on many peacekeeping missions.

After Saddam Hussein invaded Kuwait in August 1990, President Bush built up a military coalition centered on the United States military to evict the Iraqis from Kuwait. Over five months, the United States assembled and prepared a combined arms force to defeat the Iraqis. The Iraqi army was subsequently shattered after a 40-day preliminary bombardment followed by an enveloping attack through southern Iraq.

The air war over Iraq began on 17 January 1991 with a series of strikes designed to eliminate the Iraqi's integrated air defense system. The coalition succeeded in gaining complete control of Iraqi airspace. This dominance of the Iraqi airspace enabled coalition forces to fly and bomb Iraqi forces with impunity and at the same time enabled coalition ground forces to operate without the threat of enemy air strikes. The coalition's success at gaining air dominance proved easier than eliminating the Iraqi ground forces.

Over six weeks of bombing, the republican guard forces had been degraded to between 50 and 75 percent strength, with the units on the border having suffered

⁵² Trest, Warren A., *Air Force Roles and Missions: A History* (Washington, D.C.: Air Force History And Museums Programs, 1998), 227-266

somewhat heavier casualties, but they were still capable of fighting.⁵³ The coalition ground forces received limited air support, because of bad weather.⁵⁴ There were also arguments over the placement of coordination lines to separate operating areas. The air force felt that by placing the coordination lines so far in front of the forward line of troops that Iraqi forces were able to escape bombing attacks.⁵⁵ The bad weather and coordination problems did not significantly impact ground combat operations because the coalition forces had brought a huge amount of artillery with them. The ground and air campaign swiftly expelled the Iraqis from Kuwait.⁵⁶

The success of the mechanized forces in Iraq demonstrated the value of heavy artillery. As the coalition divisions advanced they often had an artillery brigade in support to destroy any resistance and to soften up targets before they were attacked. The United States Army's artillery branch used the gulf war to argue for the Crusader Artillery System. The Crusader was a 155mm self-propelled artillery system designed to operate in a high threat mechanized battle with a range of 28.2 kilometers for conventional munitions and 40 kilometers for rocket assisted munitions. These ranges outperformed the Paladin howitzer, which could fire a conventional round 22.5 kilometers and a rocket assisted round to 30 kilometers. The armor needed to protect the Crusader caused the gun and its ammo carrier to weigh 70 tons combined. The system proved difficult to deploy because of its weight. The Chief of the U.S. Field Artillery Branch, Major General Randall Rigby, extolled how the Crusader would enable the ground commander "to attack the enemy by indirect firepower throughout the operational depths of the battlefield."⁵⁷ The Sense and Destroy Armor smart submunition gave the Crusader the capability to attack enemy vehicles precisely. The U.S. Air Force already had the technical capability to carryout precision attacks throughout the operational depth of the

⁵³ Robert H. Scales Jr., *Certain Victory* (Washington, D.C., Office of the Chief of Staff, United States Army: 1993), 208, 232-236

⁵⁴ Robert H. Scales Jr., 240

⁵⁵ Benjamin S. Lambeth, *The Transformation Of American Air Power* (Ithaca, New York: Cornell University Press, 2000), 135

⁵⁶ Robert H. Scales Jr., *Certain Victory*, 1-435

⁵⁷ MG Randall L. Rigby, "Registration Points", *Field Artillery Journal* 1 (July-August 1996), 1

battlefield. The Crusader failed to provide any capabilities that could not be done by aircraft or current artillery pieces, which is why the program was canceled in 2002.

The United States' victory stunned the world as well as the Iraqis. The only weakness seen in operation Desert Storm was the excessive amount of time it took for forces to deploy to Saudi Arabia. To prevent the United States from assembling sufficient combat power, a nation cannot allow the U.S. to build up its combat power over time. This belief supports air power advocates, because the air force has the capability to project power across long distances.

Another lesson learned by other nations was not to fight the U. S. military in open terrain. By operating in confined terrain, an opponent can avoid the standoff attack capability of many U.S. weapon systems. Because operating in built up city environments negated many U.S. advantages, the U.S. Army's doctrine for operating in cities consisted of avoiding cities. This doctrine proved untenable. The United States became involved in peacekeeping missions in Port Au Prince and Mogadishu.

While the peacekeeping mission in Haiti remained peaceful, the U.S. Army became involved in the fighting to subdue one of the Somali warlords. On the 3rd of October 1993, 18 U.S. service men died in a firefight in the center of Mogadishu.⁵⁸ The soldiers became pinned down in the center of the city because they were not able to suppress the enemy forces. Air strikes using conventional bombs could not be employed, because the enemy forces were too close and intermingled with U.S. forces and the cost in collateral damage would have been excessive. AC-130 gunships could have been useful, but the U.S. Air Force refused to employ them in daylight after one had been shot down in the gulf war. Artillery would have been useless in augmenting the Rangers' firepower, but may have been useful in obscuring some parts of the battlefield using smoke. Also, since most rangers had not brought their night vision devices, artillery or mortar illumination may have been helpful. In the Somali firefight, the Rangers had

⁵⁸ Though the raid was a tactical success, the perception of heavy casualties led to the withdrawal of U.S. forces from Somalia. Had U.S. forces suffered less casualties during the raid, the political costs would have been lower. The U.S. public did not feel the costs of nation building in Somalia were justified.

relied on one source of fire support, the orbiting helicopters, which proved vulnerable to ground fire. By violating the Weinberger Doctrine and not committing sufficient force to accomplish the mission in Somalia, U.S. forces did not have the flexibility to accomplish the mission with minimal casualties.

The firefight in Mogadishu had a lasting effect on deployments to limited conflicts for the rest of the Clinton Presidency. Before deploying ground forces to Bosnia and Kosovo, the United States used its air power to force the various warring factions to agree to implement a peace agreement. In the Kosovo Campaign, President Clinton stated that there would not be a ground attack in concert with the air campaign.⁵⁹ The air campaign to force the Serbs to cease committing human rights abuses in Kosovo demonstrated some of the weaknesses as well as the successes of air power.

On the night of 24 March 1999, the United States began Operation Allied Force, an air campaign, to force the Serbs in Kosovo to cease committing human rights violations. The initial strikes were intended as a show of force to compel the Serbs to agree to NATO's demands. Like the North Koreans less than 50 years earlier, the initial air strikes failed to coerce the Serbs into compliance. The air campaign lasted for a total of 78 days. Once NATO had suppressed the Serb's air defenses sufficiently, NATO began to engage the fielded Serb forces in an attempt to halt the on going atrocities. Since the Serb leadership did not have to mass its forces to repel a ground threat, the Serb forces remained dispersed to minimize the effects of the bombing campaign. The dispersion of Serb forces did provide the KLA with some relief, enabling the KLA to carry out limited attacks. The weather and mountainous terrain in Kosovo further compounded the problem of defeating the Serb forces in the field. The amount of heavy equipment destroyed in Kosovo cannot be completely identified, but the annual data exchanges of equipment reported by Yugoslavia for its arms control agreements indicate that from January 1999 to January 2000 Yugoslavia had nine less tanks, eleven less APCs, thirty-six less artillery pieces and had gained twenty-one mortar systems.⁶⁰ The air

⁵⁹ Benjamin S. Lambeth, *NATO's Airwar For Kosovo* (Santa Monica, California: RAND, 2001), 19

⁶⁰ Bruce R. Nardulli et al., *Disjointed War, Military Operations In Kosovo, 1999* (Santa Monica, California: RAND, 2002), 55

campaign had barely outstripped Yugoslavia's military production capability for 1999. However, the strategic bombing campaign designed to make life more difficult for the Serbs in Yugoslavia proved very successful.

By bombing infrastructure and leadership targets with precision-guided munitions in Yugoslavia itself, the air campaign decreased the Serbian public's support for the war. When combined with the loss of Russian support and the threat of an eventual ground campaign, Slobodan Milosevic, the Yugoslav President, accepted NATO's demands.⁶¹ Air power advocates hailed the strategic bombing campaign as a great success. The use of precision guided munitions limited collateral damage, which reduced the backlash felt by the Serb public against NATO. At the same time, the destruction of infrastructure in Yugoslavia and its capital Belgrade lowered the morale of the Serb public and eroded support for the war. The loss of support, both domestic and foreign, combined with the persistence of NATO and the KLA forced the Serb leadership to accept an international peacekeeping force in Kosovo.

The peacekeeping mission that deployed to Kosovo after the bombing campaign brought its organic artillery, just as the 1st Armored Division had brought its organic artillery to Bosnia. The artillery operated from numerous base camps in the U.S. zone. Not only did the artillery and mortars provide base camp protection, but the platoons often supported patrols and inspection teams. In Bosnia, the artillery battalion dispersed into its six platoons, which operated in split pairs, where two guns would deploy on a "Raid" to cover a specific weapon storage site inspection or on a "Presence Mission" as a show of force. Since the Nordic contingent in the U.S. sector did not have encrypted communications initially. The various factions became intimidated and felt that the NATO peacekeepers were preparing to fight them. The artillery deployed with the U.S. peacekeeping forces provided a 24-hour a day, all weather capability that was very

⁶¹ Benjamin S. Lambeth, *NATO's Airwar For Kosovo*, 67-86

visible to the various factions, which served to deter the factions from resuming the fight.⁶²

Operation Allied Force demonstrated that strategic bombing could succeed without the need for a ground campaign, apparently vindicating air power theorists like Douhet and Mitchell eighty years after they had developed their theories. The KLA's fight for survival does not qualify as a ground campaign and NATO did not have the forces in place to launch an immediate ground campaign. While bombing served as an effective means of coercing the factions to be peaceful, ground forces had to be deployed to the area to maintain the peace. While the deployments could be scaled back after peace had been established and the dominance of the peacekeeping force was demonstrated to the factions, the peacekeeping missions have been long deployments. The forces in Bosnia have been deployed for over seven years and will not be withdrawn in the near future.

E. SUMMARY

The last hundred years have led to great advances in how the United States wages war. These advances have built up certain trends in how the United States thinks about war. The rise of fire support from being a direct fire asset to an indirect fire asset enabled larger amounts of firepower to be applied to the decisive point in a battle because the units involved were not directly engaged in the fighting. This rise led the U.S. Army's Field Artillery branch to focus on acquiring heavier systems. At the same time, the advent of aircraft led to the development of a system that could also deliver massive amounts of firepower. In order to achieve independence from the U.S. Army, the U.S. Air Force focused on dominating the air rather than providing close air support. Close air support placed aircraft in a roll where they supported the ground commander, which was counter to achieving independence from the ground forces. The United States' history in limited wars indicates that winning quickly is key, while prolonged combat eventually leads to

⁶² Timothy Prater, Interview by author, Interviews conducted by email and phone in 31 May 2003. MAJ Timothy Prater served as the Division Assistant Fire Support Coordinator to Multi-National Division (North) in Bosnia from March to September in 1997.

defeat or stalemate. This has led to the Weinberger doctrine of using overwhelming force against the enemy. Since the end of the Cold War, advances in technology enabled the U.S. Air Force to project massive power globally and very precisely. Simultaneously, the U.S. Army Artillery has stagnated, by attempting to compete with the U.S. Air Force by building the Crusader. The United States military began to follow a trend of using air power to win wars and then employing ground forces afterwards to keep the peace. In the next chapter, the campaign in Afghanistan demonstrates that this trend has continued.

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III. AIR OPERATIONS IN AFGHANISTAN

After the terrorist attacks on September 11th, the United States began to hunt for Al Qaeda and demanded that the Taliban in Afghanistan turn over Al Qaeda's leadership or suffer the consequences. When the Taliban refused to turn over Al Qaeda's leadership, the United States executed a military campaign to remove the Taliban from power and to eliminate Al Qaeda's influence in Afghanistan. The military campaign combined the use of special operations forces, light infantry forces at the end of the campaign and air power as the sole method of fire support. The success of the campaign led many to hail this as a new model of warfare, where a small U.S. ground force supporting an indigenous force could defeat a much stronger opponent by using copious amounts of air support. This chapter examines what happened during Operation Enduring Freedom and how air power proved effective and ineffective during the operation.

A. OPERATION ENDURING FREEDOM

Operation Enduring Freedom began on 7 October 2001 with air strikes targeting Taliban air defenses and terrorist infrastructure targets. The strikes had been delayed while the U.S. Air Force waited for permission to deploy combat search and rescue (CSAR) assets into Uzbekistan. To avoid political embarrassment and the appearance of impotence, the United States choose to delay air strikes until it had the capability to extract downed air crews, because the targets were considered to be of low value, while captured pilots would be very costly politically.⁶³ The tactical aircraft staged off of aircraft carriers in the Indian Ocean and from bases in Persian Gulf, while bombers flew from as far as the continental United States. By the 9th of October, the United States began to run out of quality targets. The U.S. leadership had already known that Afghanistan did not have many infrastructure targets. According to Bob Woodward, the president explained that the objective was "to get the bad guys moving. We get'em

⁶³ Bob Woodward, *Bush At War* (New York, New York: Simon and Schuster, 2002), 177-178

moving, we can see them, we can hit them.”⁶⁴ The United States succeeded, causing the terrorists to scatter and go to ground.

On 19 October 2001, a special operations force (SOF) attacked an airfield near Kandahar, called Operation Rhino, as a demonstration of U.S. capabilities and to gather intelligence. Like the Doolittle Raid in World War II, Operation Rhino served to rally American morale at home by demonstrating that the U.S. military could do more than launch cruise missiles and air strikes. At the same time Operation Rhino took place, an army Special Forces team, Team 555, deployed into northern Afghanistan to link up with a CIA team, which had flown into Afghanistan on 26 September 2001.⁶⁵

To get to the terrorists, the United States had to remove the Taliban from power. Team 555 and other teams that deployed into northern Afghanistan assisted anti-Taliban forces in overthrowing the Taliban. These Special Forces teams deployed with only their personal weapons, because they did not have the carrying capacity to haul any heavier weapons. The intelligence generated from the Northern Alliance enabled the Special Forces to target Taliban forces accurately, which enabled the Northern Alliance to overrun the Taliban in the North and capture the critical city Mazar-e-Sharif. This led to the fall of Kabul on 13 November 2001. Special Forces teams operating in southern Afghanistan with Hamid Karzai’s forces captured the Taliban stronghold of Kandahar on 6 December 2001.⁶⁶ The complete collapse of the Taliban caught the United States by surprise. The United States had set a limited objective of taking Mazar-e-Sharif before winter set in and ended campaigning for the year. At a press conference, Secretary of Defense Rumsfeld stated that he did not expect a quick victory.⁶⁷ The unexpected collapse of the Taliban enabled the United States to resume pursuing Al Qaeda forces.

⁶⁴ Bob Woodward, *Bush At War*, 153

⁶⁵ Bob Woodward, *Bush At War*, 250-251

⁶⁶ Stephen Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy* (Carlise, PA: Strategic Studies Institute, U.S. Army War College, 2002), 8-12

⁶⁷ Bob Woodward, *Bush At War*, 275-276

U.S. intelligence tracked a large force of Al Qaeda survivors to the vicinity of Tora Bora in early December. U.S. bombers carried out numerous air strikes in an attempt to destroy the survivors, but the Afghan surrogates failed to block the escape routes. This enabled many Al Qaeda to escape over the border into Pakistan.

In early March 2002, another force of Al Qaeda survivors were spotted reconstituting and reorganizing in the Shah-i-kot Valley. U.S. forces planned Operation Anaconda to trap and destroy the Al Qaeda forces. Al Qaeda forces ambushed local forces working with Special Forces, which forced the United States to commit two battalions of light infantry from the 10th Mountain Division and 101st Air Assault Division. Operation Anaconda proved to be some of the hardest fighting for American forces during the war in Afghanistan. Since Operation Anaconda, the United States has not met any organized resistance in Afghanistan.

The United States had gone from a peacetime footing to occupying Afghanistan in less than six months. Many hailed the synergy achieved between Special Forces led surrogates and precision air power as the new model of warfare for limited wars. This synergy appeared to support Robert Scales' argument that America can achieve its best success by using a small force to find and fix the enemy, then call in massive air and artillery strikes to eliminate the threat.⁶⁸ Dr. Stephen Biddle argues against this new model, claiming that the success in Afghanistan should be viewed "neither as a fluke nor as a military revolution, but rather as a surprisingly orthodox example of modern joint theater warfare."⁶⁹ For Biddle, fire and maneuver continue to play important parts in waging warfare. This contrasts with the view that small forces using precision-guided munitions can overwhelm larger, less well-trained forces. Air power had both strengths and weaknesses in the Afghanistan campaign.

⁶⁸ Robert H. Scales Jr., "From Korea To Kosovo", *Armed Forces Journal International* (December 1999), 37

⁶⁹ Stephen Biddle, *Afghanistan And The Future Of Warfare*, 43

B. THE EFFECTIVENESS OF AIR POWER

In Afghanistan the main strengths of air power were its effectiveness and availability. As in Kosovo, when enemy forces were massed, the Taliban and Al Qaeda could be relatively easily destroyed, just like Serb forces, by massed firepower from the air. One of the most useful abilities of aircraft is to operate from distant bases outside of the country in conflict. The reliance on precision guided munitions led to low collateral damage and great accuracy. The ability to retask aircraft in flight greatly increased the availability of close air support. Combined with the availability of close air support, the accuracy of the bombing offensive disrupted the ability of Taliban and Al Qaeda forces to resist the U.S. and allied forces. As a result, air power served as a critical force multiplier.

The use of massive airpower enabled the Northern Alliance to overwhelm the Taliban, a force that had previously driven the Northern Alliance into the northeast corner of Afghanistan. Until American Special Forces arrived to coordinate air strikes, the Northern Alliance had been on the defensive. With the augmented firepower, the Northern Alliance could go on the offensive. Early in the campaign, the Taliban forces would withdraw after being bombed, but later in the campaign it would require determined attacks to drive the Taliban and Al Qaeda forces from the field. At Bai Beche, the Taliban had driven back a Northern Alliance cavalry attack. A second cavalry attack was launched and struck the well-prepared positions just after an air strike. The cavalry was able to get behind the defenders, forcing them to retreat.⁷⁰ Without the massive firepower support, the Northern Alliance would probably not have been able to break through Taliban lines and defeat the Taliban and Al Qaeda. The Taliban had few supply routes it could use to move around. Once the Northern Alliance placed pressure on the Taliban forces, the Taliban forces were forced to mass to defend themselves and were easier to spot and target with air strikes. “Taliban supply lines and communications had been severed in the carpet bombing.”⁷¹ By paralyzing the Taliban forces with

⁷⁰ Stephen Biddle, *Afghanistan And The Future Of Warfare*, 38-39

⁷¹ Bob Woodward, *Bush At War*, 301

devastatingly accurate air strikes, the Northern Alliance had the freedom to maneuver and capture the critical terrain and cities.

To achieve an unprecedented level of accuracy, the United States has increased the percentages of precision-guided munitions it uses. In the Gulf War in 1991, the United States used only 7-8 percent precision munitions to attack Iraqi forces. This percentage rose to 35 percent in the Kosovo air campaign and increased to 56 percent in the Afghanistan campaign. The United States achieved this level of usage because of the low cost of the JDAM, Joint Direct Attack Munition. JDAM kits cost roughly \$14,000 and convert an old unguided 1,000-pound or 2,000-pound bomb into a GPS, Global Position System, guided weapon that can be accurate to less than ten meters.⁷² The use of so many precision munitions by the United States intimidated the Taliban and Al Qaeda forces and increased the morale of the Afghan allies. It enabled the United States to engage and destroy numerous point targets that had required a direct hit to be destroyed. This allowed the United States to target buildings in cities and still minimize collateral damage and to reduce the number missions required to re-strike targets.

The precision of U.S. air strikes shortened the war by conveying a level of capability the Afghans had not expected from the Americans:

There was a television antenna on top of a small hill in Kabul that had been a favorite target of the Soviets though they had never succeeded in hitting it. The Northern Alliance had also tried and failed. An American jet streaked in and, with one bomb, the antenna was gone. Word spread through the capital: The Americans are going to win, this is over.⁷³

The destruction of the antenna by one bomb sent a message to both the Taliban forces and civilians in Kabul that resistance was futile. The U.S. had the capability to crush any opposition and destroy any target. When combined with the message of resolve sent by committing ground forces, the Taliban realized the U.S. had both the will and ability to

⁷² Anthony H. Cordesman, *The Lessons Of Afghanistan* (Washington, D.C.: Center for Strategic and International Studies, 2002), 12

⁷³ Bob Woodward, *Bush At War*, 312

defeat them. The Taliban abandon Kabul and the Afghan civilians in Kabul celebrated their liberation.

The use of precision-guided munitions enabled the use of less aircraft to accomplish a mission and allowed the aircraft to operate from a much higher altitude. The U.S. and its allies flew up to 200 sorties per day. In comparison, the U.S. and its allies flew up to 2,000 sorties per day in Kosovo and 2,800 sorties per day during the Gulf War in 1991.⁷⁴ This enabled the U.S. to commit fewer airframes to attacking Afghanistan, which left forces available for other operations and reduced the probability that an aircraft would go down in Afghanistan. The use of precision-guided munitions rendered U.S. aircraft invulnerable to ground fire, because they could fly safely above it. Normally, operating from high altitudes significantly reduces the accuracy of bombs, but the GPS guided JDAMs eliminated this problem. By reducing the risk to U.S. aircraft, the administration reduced the chances of Al Qaeda capturing a U.S. serviceman or woman, which the administration believed would have been a public relations nightmare and increased the leverage Al Qaeda would have.⁷⁵ The use of precision-guided munitions lowered the perceived political costs of operating in Afghanistan.

The ability to retask aircraft enabled the U.S. to use fewer aircraft as well. If an aircraft's target could not be attacked because of weather or another reason, the aircraft could be retasked to engage or support a different mission. This increased the amount of air support provided to the Special Forces teams, though they were not the priority at the time.⁷⁶ Many of the U.S. Navy aircraft arrived over Afghanistan without a specific target or had the target changed in flight.⁷⁷ The lack of an air defense threat combined with the ability to retask and program each JDAM enabled heavy bombers, B-1s and B-52s, to loiter over the battlefield waiting for targets of opportunity. This increased the responsiveness of close air support significantly.

⁷⁴ Anthony H. Cordesman, *The Lessons Of Afghanistan*, 11. Part of the low sortie rate for Afghanistan, in comparison with Kosovo and the Gulf War, stemmed from lack of worthwhile targets in Afghanistan

⁷⁵ Bob Woodward, *Bush At War*, 177-179

⁷⁶ Bob Woodward, *Bush At War*, 264

⁷⁷ Anthony H. Cordesman, *The Lessons Of Afghanistan*, 111

Operating aircraft from bases in other countries or from aircraft carriers also lowers the political risks during a conflict. The aircraft and aircrew are all that is risked over the enemy country. The ground crew and support facilities can remain in a friendly country. This reduces the logistical footprint in combat areas, reducing the vulnerability of the support systems. Also, by operating from permanent bases, the facilities can be improved over time and are usually better than temporary bases hastily established in the combat zone. The support facilities at our airbases in Qatar are far better than the facilities are at Bagram Airbase in Afghanistan. Some of the drawbacks to operating aircraft from other countries will be addressed in the next section.

C. HOW AIR POWER PROVED INEFFECTIVE

While the Afghan campaign demonstrated some of the great strengths of air power, the campaign also demonstrated some of the weaknesses of air power. Under certain circumstances, some strengths turned out to be weaknesses. The use of large bombs increased the risks of fratricide and of collateral damage. To stay out of a danger area, air strikes had to be kept at a distance from friendly positions. The U.S. experienced difficulties in targeting. For ground forces, there is a requirement for a ground forward air controller (GFAC) or enlisted terminal air controller (ETAC) to call in JDAMs. While response times have improved, it still takes too long for an air strike to hit after it has been requested. Part of the slow response time is caused by the low priority assigned to close air support missions. Weather still impacts the effectiveness of air support, often limiting the coverage ground units receive. All of these weaknesses became apparent during Operation Enduring Freedom. While some can be fixed by technical solutions, others require a shift in the willingness of commanders to take risk.

At most times using a bigger bomb is an advantage. But there are occasions when a smaller burst is preferable. Currently, JDAMs can only be used with 1,000-pound and 2,000-pound bombs. While the minimum safe distances for JDAMs is currently unavailable, the minimum safe distances for soldiers assaulting an enemy position being

struck by a 1,000-pound laser guided MK 83 bomb are 275 meters for a probability of incapacitation, PI, of 10 percent and 500 meters for a PI of 0.1 percent. The term probability of incapacitation is based on the probability that a soldier will receive an injury requiring medical evacuation. The probabilities are based on a soldier standing, which is the best simulation for assaulting infantry. Bomb fragments can be thrown significantly beyond these distances.⁷⁸ When prone or under cover, bombs can be dropped much closer with a lower degree of risk. Depending on how much risk a commander is willing to accept, air strikes suppressing an objective the infantry is assaulting have to be stopped while the infantry is still a considerable distance from the objective.

Often, infantry forces engage enemy forces at distances considerably closer than 275 meters. During Operation Anaconda, a forward air controller was calling in air strikes extremely close to friendly defensive positions. A bunker just up the hill, 50-75 meters from friendly forces, pinned down U.S. soldiers with machine gun fire. The pilot became nervous about how close the air strikes with 500-pound bombs were to friendly positions when the controller said, "Whoa, you almost got us with that one." The controller then asked the pilot to try to drop the next bomb closer to their position. The pilot worried that if he dropped the bomb any closer, the rangers and the controller would be caught in the fragmentation pattern.⁷⁹

During the campaign in Afghanistan, the tactical situation often forced commanders of assaulting forces to choose between taking friendly-fire casualties and having the effects of an air strike wear off, which would lead to casualties from enemy fire. Despite two days of air strikes near Bai Beche, the Taliban defenders repulsed a cavalry charge by Northern Alliance soldiers conducted after the air strikes had ended. Due to a miscommunication, a second cavalry charge was launched just as some laser-guided bombs were dropped on the enemy positions. The U.S. Special Forces

⁷⁸ MAJ Gerard Pokorski and Lonnie R. Minton, "Risk Estimate Distances For Indirect Fires In Combat," *FA Journal* 2 (March-April 1997), 9

⁷⁹ Bradley Graham, "Bravery And Breakdowns In A Ridgetop Battle," *Washington Post*, 24 May 2002, sec A, p. A01, Downloaded from the Lexis -Nexis database at www.nexis.com on 3 June 2003

commander believed that the cavalry charge would be caught in the fragment pattern of the air strike because they were inside the minimum safe distance from the target. Luckily, the cavalry was just outside of the effects when the air strike hit enabling them to overrun the stunned defenders. The attack succeeded because a miscommunication integrated maneuver with its fire support “far tighter, . . . , than either Dostum’s troops or their supporting SOF would ever have dared arrange deliberately.”⁸⁰ Like in Kosovo, the Taliban and Al Qaeda forces learned to camouflage and dig in to protect themselves. As a result, enemy and friendly forces were often very close together during many engagements. Weapon systems using a smaller burst radius would have been safer to support the cavalry charge at Bai Beche and the soldiers pinned down during Operation Anaconda.

Unless the bomb destroys the enemy position, which does not happen very often, unless using precision-guided munitions combined with accurate target intelligence, the enemy forces will only be suppressed for as long as the air attack is taking place. At Bai Beche, two days of air strikes had not neutralized the defenders. The cavalry had to force them to withdrawal. During Operation Anaconda, Al Qaeda forces would duck into caves when they heard fixed-wing aircraft approaching. Unless using a precision-guided munition, the caves generally survived the air strike. When the air strike ended, the Al Qaeda fighters would emerge from the cave and resume fighting. To stop this, the Americans would either use mortars and machine guns to kill the Al Qaeda fighters. When unable to kill the Al Qaeda fighters, the Americans would suppress them with machine guns and mortars, blocking the Al Qaeda fighters from escaping into a cave, so an air strike could kill them.⁸¹ The U.S. ground forces had difficulties getting the Taliban and Al Qaeda forces to hold still long enough for an air strike to hit them.

Air power in Afghanistan achieved amazing results against static well-defined targets, but getting the Taliban and Al Qaeda forces to hold still long enough for an air strike was difficult. Often the enemy forces would have moved before an aircraft could

⁸⁰ Stephen Biddle, *Afghanistan And The Future Of Warfare*, 38-39

⁸¹ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” interview by Robert H. McElroy, *FA Journal*, ed. Patricia Slayden Hollis, (September-October 2002), 7

be summoned to strike them. The response times of aircraft were too long, “in many cases, mission briefings occurred up to nine hours before aircraft actually arrived on scene.”⁸² MG Hagenbeck explains that during the opening of Operation Anaconda:

But for the first three or four days, we faced “fleeting” targets. By the time the AWACS [airborne warning and control system aircraft] handed a target off, the Air Force said it took 26 minutes to calculate the DMFI [desired mean point of impact], which is required to ensure the precision munition hits the target. Then the aircraft had to get into the airspace management “cue.” It took anywhere from 26 minutes to hours (on occasion) for the precision munition to hit the targets.⁸³

The Special Forces teams operating in October and November also had to contend with the problem that the Air Force considered striking fixed targets the priority. According to Bob Woodward, a CIA agent “had witnessed too many occasions when the A-team would spot a convoy ... and call and call to get a bomber and couldn’t get one.”⁸⁴ The U.S. Air Force maintained that fixed targets were still the priority. When the Taliban’s and Al Qaeda’s convoys and logistical structure became a higher priority, their forces began to collapse.

The weather affected availability of aircraft as well. When the ceiling would drop due to heavy cloud cover, air coverage would become limited. Luckily, the weather started out good for Operation Anaconda and did not deteriorate until several days into the operation, when the U.S. ground forces were not as dependent on air support.⁸⁵ Even though the JDAM can be dropped through cloud cover and will home into its target, the Air Force preferred to be able to get a visual sight on the target.

Daylight could also be a problem. Since an AC-130 was shot down in Iraq during Gulf War in 1991, the U.S. Air Force has only operated the aircraft at night. This became a problem during Operation Anaconda when the opening air assaults landed. The air

⁸² Anthony H. Cordesman, *The Lessons Of Afghanistan*, 111

⁸³ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” 8

⁸⁴ Bob Woodward, *Bush At War*, 264

⁸⁵ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” 9

assaults arrived just as dawn began and became involved in a major firefight. Since it was dawn, the AC-130 that had been on station left to return to its base, leaving the Special Forces engaged on the ground without air support initially.⁸⁶ Like the marines in the Mayaguez incident, the Special Forces soldiers had to fend for themselves as they struggled to survive on a hot landing zone.

One of the largest problems encountered was the requirement that only Air Force certified personnel could call in precision-guided air strikes using JDAMs. The Air Force believes that the complexity of precision munitions requires that the person controlling a JDAMs strike either be a certified ground forward air controller (GFAC) or an enlisted terminal attack controller (ETAC). As MG Hagenbeck recounts:

That platoon happened to have the battalion commander and an ETAC in it. That night, the ETAC was extracted. For the next 24 hours until we could get the ETAC reinserted, not even the battalion commander could call in precision-guided munitions.⁸⁷

Major General Franklin Hagenbeck then raises the question of what happens to a ground unit's air support if the ETAC or GFAC is incapacitated. The problem is there are not enough GFACs and ETACs to support the dispersed ground maneuver forces operating in a limited conflict.

The campaign in Afghanistan highlighted some of the failures of relying exclusively on air power for fire support. The successful integration of air power with the Special Forces teams that supported the anti-Taliban forces achieved impressive results in Afghanistan, but would be difficult to duplicate in another country. The war in Afghanistan was fought to a standoff by two equal sides until the U.S. intervened by integrating air power with the anti-Taliban factions. The U.S. intervention tipped the balance enabling the anti-Taliban forces to defeat the Taliban and disperse Al Qaeda. The

⁸⁶ Bradley Graham, "Bravery And Breakdowns In A Ridgetop Battle," sec A, p. A01

⁸⁷ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 9

lack of competing missions combined with the permissive environment enabled the air force to retask aircraft to support ground forces. At times, gaps in air coverage appeared and placed ground forces in dangerous situations. At a Senate Armed Services Committee hearing, the Army Chief of Staff, General Eric Shinseki, testified that the reliance on air power alone for fire support led to increased casualties and that if artillery had been present at Operation Anaconda it could have reduced friendly casualties.⁸⁸ In the next chapter, the utility of artillery in Afghanistan will be examined and whether artillery can provide better fire support to ground forces than air power in a limited conflict as Gen Shinseki maintains.

⁸⁸ Anthony H. Cordesman, *The Lessons Of Afghanistan*, 68

IV. ARTILLERY IN LIMITED CONFLICTS

General Shinseki, Army Chief of Staff, maintained that artillery could have provided better support to the ground maneuver forces than the air power that was used. This chapter examines the validity of that statement and then examines how artillery can be used in a limited conflict. The ground operations in Afghanistan fit into three categories; first, special operations forces conducting direct actions, Operation Rhino is an excellent example; second, special operations forces assisting surrogate forces to fight the Taliban and Al Qaeda; finally, regular light infantry formations operating in Afghanistan after the Taliban fell from power. After examining the operating methods of ground forces in Afghanistan, we can easily examine how artillery and mortars can be employed in limited conflicts demonstrating the continuing relevance of indirect fire systems. Finally, the question of whether artillery could have been more useful than air power, as General Shinseki maintains, needs to be examined.

To understand what kind of support a military unit needs, it is important to understand how the military unit operates. During Operation Enduring Freedom, the U.S. ground forces and its allies operated in different ways during the campaign based on the situation and resources available. At the beginning of the campaign, resources limited the amount of ground forces available to be employed in Afghanistan. Since the U.S. did not have strong ties and basing agreements with Afghanistan's neighbors prior to the September 11th terror attacks, the U. S. had to establish ties and usage agreements before the U.S. could deploy significant amounts of troops and material to Afghanistan. The bombing campaign had been delayed by the delays in positioning a combat search and rescue capability. Similarly, the first ground operations in Afghanistan used small forces, because the U.S. had not yet built up its forces and support structures.

Without large forces in the region, the first units to be able to operate in Afghanistan were special operations forces that have the capability of deploying rapidly. These units were capable of linking up and working with anti-Taliban forces and of coordinating raids against Al Qaeda and Taliban bases. The raids against Al Qaeda and

Taliban bases would be short duration attacks designed to destroy any forces and facilities and not to seize territory. Operation Rhino employed a company of rangers operating with special operations forces in an airborne raid on one of Mullah Omar's compounds, the spiritual leader of the Taliban. The raid demonstrated the U.S. could do more than just bomb Afghanistan. American troops gathered intelligence and eliminated an enemy facility. While the U.S. has the capability to air drop or airlift artillery into combat, this is normally done when the plan is to seize the terrain. On a short duration raid, like Operation Rhino, the objective is to complete the mission and withdraw very quickly. In the 10-15 minutes it would take to get the artillery or mortars prepared for combat, the raid would hopefully be almost complete. Also, the limited lift capability of the CH-47s used to transport our forces would require a choice between carrying more infantry or lifting artillery pieces for the raid. Rather than deploy artillery or mortars, AC-130 gunship support would be able to cover the raid from the first troop hitting the ground until the last helicopter lifted off to exfiltrate our forces. The only time artillery support would be useful in a short duration raid would be when the raid took place in a location already underneath existing artillery coverage.

The other operations taking place at the beginning of the Afghanistan campaign consisted of special operations forces coordinating air support for the anti-Taliban forces. These teams consisted of twelve men or less and each deployed with up to 300 pounds of equipment and supplies needed for coordinating air strikes and designating targets.⁸⁹ The teams deployed with just their personal weapons for self-defense and did not have the ability to carry mortars. The teams would have loved to carry heavier weaponry, but could not even bring Barrett's, a .50 caliber sniper rifle that is good for long range sniping and destroying light vehicles.⁹⁰ The teams deployed to coordinate air support and did not have the carrying capacity to bring heavier weaponry and the Afghans did not have the capability to carry the equipment either.

⁸⁹ Bob Woodward, *Bush At War* (New York, New York: Simon and Schuster, 2002), 249

⁹⁰ CPT D, Interview by author on 5 June 2003, Interviews conducted at Naval Post Graduate School. CPT D is a member of the Special Forces who deployed to Afghanistan during Operation Enduring Freedom.

The anti-Taliban forces did not have heavy weapons when the Special Forces teams arrived, and the teams did not have time to supply or train the Afghans to use artillery or mortars. As the offensive progressed the U.S. forces and allies captured Taliban and Al Qaeda artillery, mortars and ammunition.⁹¹ The pace of operations went to fast to stop and train enough anti-Taliban forces on how to use the numerous types of weapons. CPT D vehemently explained, when interviewed, that so few Afghans had such little understanding of how to operate the captured heavy weaponry, that sudden integration of indirect fire assets with the Afghans would present a danger to the Afghans and the special forces teams if allowed to use artillery and mortars in combat without training.⁹² An indirect fire capability would have been useful during the times that air support was unavailable. At Tora Bora and other battles, Taliban and Al Qaeda forces could be seen escaping while waiting for an air strike, but the forces deployed to Afghanistan had to deploy light and could not take everything and most of the supported forces did not have the technical ability to make use of captured equipment. The Special Forces did not have an opportunity to train the Afghans to integrate artillery into their operations, because the ground war was progressing too rapidly to halt and conduct training.

Once the Taliban had been driven from power, the campaign in Afghanistan changed and the U.S. had the time to establish a logistics base at Bagram Airbase near Kabul. This enabled the U.S. to deploy regular light infantry forces, from the 10th Mountain Division and 101st Air Assault Division, into the country. As the build up took place, commanders still had to choose what they needed immediately and what could be brought in with follow on forces. Artillery, its logistic support and the transport to haul ammunition can absorb a lot of airlift capacity. In Desert Storm, according to Major General Robert Scales, an armored division's artillery and its support weighed roughly 62,000 tons, which is a lot to deploy to a theater.⁹³ MG Hagenbeck, the commander of

⁹¹ Stephen Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy* (Carlise, PA: Strategic Studies Institute, U.S. Army War College, 2002), 23

⁹² CPT D, Interview by author

⁹³ MG Robert H. Scales, "Transforming The Force—From Korea To Today," interview by Patricia Slayden Hollis, *FA Journal*, ed. Patricia Slayden Hollis (July-August 2001), 8-9

coalition forces in Afghanistan, felt that the artillery was not needed, because “it was clear we could capitalize on our mortars as well as on the Army, Air Force, Marine and Navy aviation assets.”⁹⁴ The general believed that artillery would be redundant and was not worth the resources necessary to bring the systems to Afghanistan. Additionally, limited helicopter lift and unusable roads constrained the amount of force that could be tactically employed during an operation.

When asked if he would have used artillery in Operation Anaconda to support the assault into the Shah-I-Kot Valley, if it had been available, MG Hagenbeck replied that “I *always* [MG Hagenbeck’s emphasis] want organic fire support systems- *always*,” but “because of the terrain and the lack of road systems, I would not have brought them in on the first day.” The general contradicts himself later by stating that ground based indirect fire support is “indispensable.”⁹⁵ Since the commanders did not know what kind of anti-aircraft capability Al Qaeda had as they planned Operation Anaconda, they would not have felt comfortable about sling loading in howitzers into the area. Deploying howitzers in support of Operation Anaconda would have forced the general to choose between artillery and bringing more troops to the battle. The general felt that deploying artillery to offset locations would have required deploying some of the infantry to secure the positions and that it would have increased the tradeoff between choosing to bring howitzers or more infantry. Since MG Hagenbeck had air support and mortars, he felt that there was no need for artillery.⁹⁶

Though the mortars have half the range of 105mm howitzers, they proved very useful during Operation Anaconda in that they could be used to suppress enemy forces. They were used to destroy and suppress Al Qaeda forces when aircraft were unavailable and to engage Al Qaeda forces that would hide inside caves whenever a fixed wing aircraft was heard. 105mm howitzers would have provided slightly more accurate fires and have provided more explosive power than the 60mm and 81mm mortars used. Like

⁹⁴ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” interview by Robert H. McElroy, *FA Journal*, ed. Patrecia Slayden Hollis, (September-October 2002), 6

⁹⁵ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” 6-7

⁹⁶ MG Franklin L. Hagenbeck, “Afghanistan: Fire Support For Operation Anaconda,” 5-8

mortars, artillery provides fires much faster than air support. The time standard for a dedicated howitzer unit to provide fire support to a maneuver force is 9 minutes, including the time to clear the mission through the brigade and battalion, which were not present at Operation Anaconda.⁹⁷ This is considerably faster than the 26 minutes or longer that it took to get an air strike.⁹⁸ As a result, had it been possible to deploy artillery to support Operation Anaconda, the artillery would have proved very useful.

While artillery and mortars could have helped the special operations forces deployed to Afghanistan, the forces did not have the capacity to move them or the logistical trail to support artillery or mortars. Only in Operation Anaconda could light howitzers have helped support U.S. ground forces. MG Hagenbeck indicated that artillery would have consumed too much lift capacity in the early part of Operation Anaconda and would have been left behind for that reason.⁹⁹ During the Battle for LZ X-Ray in the Ia Drang valley in Vietnam, LTC Moore had two batteries dropped into another LZ (LZ Falcon) prior to the insertion at LZ X-Ray.¹⁰⁰ Artillery gun crews are large enough to be able to defend their own positions. Bringing the guns in prior to the air assault would have solved MG Hagenbeck's issues with bringing in artillery to support Operation Anaconda. Deploying early would enable the artillery units to identify and occupy safe firing locations. The helicopters could have been used to preposition the guns and then returned to pick up the troops for the operation. If necessary, the guns could have been staged at Gardez, which is near the Shah-I-Kot Valley and held in reserve. Bringing the guns in early might have cost the element of surprise. Since the Al Qaeda forces were expected to try to escape rather than stand and fight, deploying artillery early to support the assault into the Shah-I-Kot Valley might have alerted the Al Qaeda forces, which would enable them to escape.

⁹⁷ LTC Mark R. Mueller, "Improving Close Contact Fires," *FA Journal* (September-October 2002), 6

⁹⁸ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 8

⁹⁹ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 6

¹⁰⁰ LTG Harold G. Moore and Joseph L. Galloway, *We Were Soldiers Once...And Young* (New York, New York: Random House, 1992), 64-67

There are tactics and techniques that can be used to camouflage the movement of artillery units. By conducting feints prior to an operation, a commander can lull the enemy into believing a move is not tactically significant. Another technique is to leak disinformation about the intended purpose of deploying guns to a specific location.

Since the U.S. had chosen not to deploy artillery to Afghanistan, whether it would have been employed in support of Operation Anaconda remains debatable. General Shinseki argued that the Crusader artillery system could have saved lives. General Tommy Franks, the CENTCOM commander, told reporters that he believed the Crusader would not have been used. General John M. Keane, the Vice Chief of Staff of the Army, testified before the Senate Armed Services Committee that “Crusader could have been flown into Bagram air base aboard a C-17 transport jet and driven to Gardez within easy range of the battlefield.”¹⁰¹ If this were true, then the U.S. Army would have deployed a Paladin artillery battery or battalion to provide fire support to U.S. forces after Operation Anaconda. The Paladin artillery system is the predecessor to the Crusader and can also be delivered by C-17 and could have also reached the battlefield easily. The 82nd Airborne Division, which replaced the 101st in Afghanistan, did bring one of its artillery battalions. The battalion has one battery of 105mm howitzers and two batteries of 120mm mortars. The 82nd uses the howitzers for both base camp defense and also deploys it by road and helicopter to support patrols.

Artillery support of special operations forces in Afghanistan may have helped them accomplish their mission, but it more likely would have impeded them. The special operations forces achieved their success in Afghanistan by being highly mobile. To maintain their mobility, these forces have to travel light. The Afghan allies had some artillery pieces, but did not have the tactical expertise to integrate them into the campaign. Artillery and mortars would have slowed the special forces teams down by either forcing them to pause the offensive while they stopped to train their Afghan allies or to wait until a sufficient logistics tail had been developed. Once regular army units

¹⁰¹ Vernon Loeb, “General Franks Sides With Rumsfeld On Usefulness Of Crusader Weapon,” *Washington Post*, 3 June 2002, sec A, p. A13, Downloaded from the Lexis-Nexis database at www.nexis.com 3 June 2003

started to deploy to Afghanistan, light artillery would have been useful. Light Howitzers can be sling loaded or towed by truck. Heavy artillery like the Paladin or Crusader, though able to fire a heavier shell further, would have been much less useful, because they cannot be transported by helicopters and would have been limited to the few roads in Afghanistan by the mountainous terrain. Prior to Operation Anaconda the howitzers could have been staged at Gardez, where they would have been available if Operation Anaconda encountered problems. Light howitzers would have been useful for other missions in Afghanistan as well.

A. ARTILLERY IN LIMITED CONFLICTS

Ground based fire support systems have many uses in limited conflicts beyond the straightforward roll of firing at enemy formations 24 hours a day in any weather. In support of maneuver forces, artillery and mortars have many different munitions that can be used for purposes other than killing. Developed in Bosnia by the 1st Armored Division, presence missions deterred the former warring factions from resuming hostilities by conveying a visible deterrence. Artillery and mortars can be used for unorthodox missions as well. Artillery can be used to distract an enemy's attention as part of a display. During Operation Anaconda, the ground component used mortars to prevent Al Qaeda troops from escaping into their caves, which enabled the air force to eliminate them. The U.S. military is working to develop non-lethal rounds to facilitate riot control and provide a range of responses below the use of lethal force.

Though unorthodox missions provide flexibility to the commander, the purpose of the artillery and mortars is to provide fast, effective fire support to the commander 24 hours a day, rain or shine. The 82nd Airborne has deployed an artillery battalion and relies on it often. MAJ S. explained, "One thing we have validated here, it is that light artillery/mortars are a must, especially in this environment. When weather is bad and CAS is not available, we rely on the guns."¹⁰² The ground commander owns his artillery

¹⁰² MAJ S., Interview by author, Interviews conducted by email on 4 April 2003. MAJ S. is an Assistant Fire Support Coordinator in the 82nd Airborne Division deployed to Afghanistan.

and mortars, which means that he controls them, unlike aircraft, which he does not control and must wait until he gets priority or his request is granted. During Operation Anaconda, the battalion commander of 1-87 IN could not get precision-guided munitions to support his battalion, but the mortars of his battalion belonged to him. On multiple occasions it took hours to get a target hit by an air strike, which is much slower than it takes for mortars and artillery to engage a target.¹⁰³ This ensures that the fires he requests are quickly provided.

The commander also has the ability to echelon his fires. The term echeloning fires means to be able to plan fires to continue to land on a target as the assaulting infantry approaches. This takes into account the varying minimum safe distances air, artillery and mortars require to be employed to support an attack. If a commander has multiple fire support assets supporting his attack against an enemy position, he can initiate the suppressing fires against the position using air and artillery. As the assaulting infantry approaches the objective, the commander can lift the air and artillery and continue to have the mortars strike the objective. When the assaulting infantry reach the minimum safe distance for the mortars, the commander can have the fires lifted. The assaulting infantry should be close enough to assault the objective before the suppression on the defenders wears off. The table below shows the minimum safe distances that assaulting infantry can approach as indirect fire strikes an objective:

Weapon	Description	Minimum Safe Distance (In meters)	
		10% PI	0.1% PI
MK 82 LD	500-pound bomb (low drag)	250m	450m
MK 82 HD	500-pound bomb (high drag)	100m	350m
MK 83 LD	1,000-pound bomb (low drag)	275m	500m
MK 83 HD	1,000-pound bomb (high drag)	275m	500m
MK 83 LGB	1,000-pound bomb (laser guided)	275m	500m
MK 84 LD	2,000-pound bomb (low drag)	225m	500m

Table 1 Risk estimates for aerial delivered munitions.¹⁰⁴

¹⁰³ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 9

¹⁰⁴ MAJ Gerard Pokorski and Lonnie R. Minton, "Risk Estimate Distances For Indirect Fires In Combat," *FA Journal* 2 (March-April 1997), 9

In comparison, the minimum safe distances for mortars and artillery is:

Caliber	#of guns	System	Shell/ Fuze	10% PI (Radius in meters)			0.1% PI (Radius in meters)		
				1/3 Range	2/3 Range	Max Range	1/3 Range	2/3 Range	Max Range
60mm	3	M224	HE/PD	60	65	65	100	150	175
81mm	3	M29A1	HE/PD	75	80	80	165	185	230
105mm	4	M119	HE/PD	85	85	90	175	200	275
155mm	4	M198	HE/PD	100	100	125	200	280	450
155mm	4	M198	DPICM	150	180	200	280	300	475

Table 2 Risk estimates for indirect fire systems.¹⁰⁵

As explained previously, the PI stands for the probability that a soldier will suffer an injury requiring medical evacuation. The data is based on infantry assaulting or standing in the open. If the soldiers are under cover or prone, the risk of injury decreases.

By echeloning fires, infantry can close to within 100 meters of an objective while it is being suppressed by mortars with a one in a thousand chance of being injured, which is five times closer than an infantryman can get to an objective being attacked by MK-83 laser guided 1,000-pound bombs. The infantryman has a much better chance of crossing the additional 400 meters if the target is being suppressed.

If shell fragments present a danger of collateral damage or fratricide, then the mortars or artillery can obscure the area with smoke. Depending on weather conditions, artillery and mortar generated smoke can last for minutes. Smoke can be used to screen friendly forces from the enemy by placing the smoke between enemy and friendly forces. Smoke can also be used to obscure the enemy's vision by placing it on top of their position, which can sow confusion and disrupt communications. If equipped with white phosphorous smoke rounds, the rounds can be used to set things on fire or to mark a target for aircraft.

¹⁰⁵ MAJ Gerard Pokorski and Lonnie R. Minton, "Risk Estimate Distances For Indirect Fires In Combat," 10

Illumination rounds can also be used for marking a target. Though not very useful for U.S. forces equipped with night vision devices, few of the anti-Taliban forces have night vision capabilities. Illumination rounds also have a slight ability to ignite combustibles, though not as effectively as white phosphorous.

The wide variety of munitions available for use by artillery and mortars provide the maneuver commander with a range of capabilities. Artillery and mortars can be used to direct fire on a target if needed. This can be useful against cave entrances protected from above by overhanging rocks. Al Qaeda often selected caves that were impervious to most American bombs. MG Hagenbeck recalled that it became necessary to put a \$14,000 JDAM into each cave entrance, which is a problem since JDAMs were in limited supply.¹⁰⁶ In World War II, U.S. forces used 155mm artillery pieces firing direct fire to blow the doors off of bunkers.¹⁰⁷ The concussion would stun the defenders to the point where they could not resist, but leave them alive to be interrogated. The use of direct fire artillery would have been useful at the siege of the prison in Mazar-e-sharif where Al Qaeda prisoners revolted on 25 November 2001. The U.S. forces in Mazar-e-sharif needed air strikes to suppress the revolt. However, integrating the assaults into the prison with air strikes proved very difficult because of the large minimum safe distance required for using 1,000 and 2,000-pound bombs coupled with the difficulties of positively identifying their target. Using air strikes to suppress the uprising proved inefficient. If the anti-Taliban forces had had a mortar or field gun, they could have lobbed rounds into the prison continuously as they assaulted it.

Furthermore, artillery and mortars are also useful for harassing an enemy force. When used for harassing fire, artillery and mortars are cheap weapons and pinpoint accuracy is not necessary. The purpose of the harassing fire is not to kill the enemy, but to lower their morale and to intimidate them.

¹⁰⁶ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 6-7

¹⁰⁷ Stephen E. Ambrose, *Citizen Soldiers* (New York, New York: Touchstone, 1997), 164

In limited conflicts, where fighting has subsided, the objective is often to deter the resumption of violence between warring factions by maintaining an image of strength. During the peacekeeping missions in Bosnia and Kosovo, the divisions and brigades deploying on the peacekeeping missions would use their artillery and mechanized forces to coerce the various factions into behaving. When a patrol went out to inspect a weapon storage site or recon the area, the artillery battery in its area would plan a presence mission to ensure the patrol remained inside the radius of artillery coverage.

In the Balkans the presence mission served as a visible reminder to the factions that the peacekeepers were prepared for any contingency. When preparing for the raid, the commander would select a route that would be visible to the various factions. Unlike in combat, the objective is to be seen. By presenting a visible presence, the artillery unit signals that the American military is prepared to use whatever level of force is needed. President Theodore Roosevelt once said, “Speak softly and carry a big stick.” The presence mission is the maneuver commander’s way of showing people that he has a big stick.

In 1997, when the 1-6 FA conducted a relief in place of 1-7 FA, the incoming commander gave guidance that each firing platoon was to conduct a fire support rehearsal with its supported unit every day. The platoons supporting the NordPol Brigade had to practice their fire missions over unsecured radio nets. The units they supported were from nine other nations and did not have the encryption that U.S. units had. Within a week, the leaders of the three different factions in NordPol Brigade’s sector had met with the commander and asked what they had done to anger him. All three factions had monitored the artillery unit’s rehearsals for combat and the faction leaders wanted to know what they could do to get back in the NordPol Brigade commander’s good graces.¹⁰⁸ This not only made the commander’s job easier because the factions were intimidated, but it confirmed that each faction was collecting intelligence on the peacekeeping force by monitoring their radio nets. While the light artillery deployed to Afghanistan has not been

¹⁰⁸ Timothy Prater, Interview by author, Interviews conducted by email and phone in 31 May 2003. MAJ Timothy Prater served as the Division Assistant Fire Support Coordinator to Multi-National Division (North) in Bosnia from March to September in 1997.

conducting presence missions in the same way that heavy artillery units are doing in Bosnia, the unit has been conducting numerous air assault operations to support maneuver forces and is often seen deploying in helicopters throughout the area of operations.¹⁰⁹ This provides a visible presence that the Afghans can observe.

Employing the supporting artillery as a deterrent is an unorthodox mission. Other unorthodox ways of employing artillery in limited conflicts are to distract enemy forces by carrying out a display. Non-lethal munitions are being developed to enable artillery to assist the maneuver commander in dealing with civilian mobs. In Bosnia, the various factions often hold demonstrations and the United States is often challenged to find a non-lethal solution to the problem.

The Field Artillery has been developing rounds that deploy maloderants, engine disruptors, combustion inhibitors, flash-bang devices, taggants, foams and obscurants. The objective of these rounds is to disperse crowds, identify demonstrators from civilians and to immobilize vehicles without destroying or killing. Since these munitions are still under development, it cannot yet be determined whether they will be cost effective. When fully developed and deployed, these munitions will provide the maneuver commander with an increased range of possible responses in a situation not requiring lethal force.

When lethal force is required, having artillery available provides the commander with expanded options. In Operation Anaconda, when Al Qaeda fighters heard approaching fixed wing aircraft they would seek shelter in caves that were invulnerable to most aerial delivered munitions. When the air strike had ended, the Al Qaeda fighters would come out of the cave to continue fighting. If the mortars were not able to penetrate the cover provided by the Al Qaeda fighter's fighting position, the mortars were used to prevent the fighter from retreating into the cave when an air strike was about to take place. MG Hagenbeck reported that the U.S. forces achieved a number of kills using this

¹⁰⁹ MAJ S., Interview by author, Interviews conducted by email on 4 April 2003.

method.¹¹⁰ By developing unorthodox methods of applying firepower, U.S. forces achieved better effects than if they had employed the systems in doctrinal manners.

Doctrine calls for the execution of combined arms operations to achieve victory. In Afghanistan, the U.S military chose not to employ field artillery in support of its regular ground maneuver forces, which occasionally left the ground forces without fire support. When the special operations forces deployed to Afghanistan, this could not be helped because the U.S. had not been able to deploy the needed logistic infrastructure to sustain artillery fire support. Even after the 101st and 10th divisions deployed, employing heavy mechanized artillery, like the crusader, would have been an impediment and not a boon. But light artillery, like the M119 105mm howitzer, would have facilitated operations by providing coverage when aircraft were unavailable or capabilities that aircraft cannot provide.

¹¹⁰ MG Franklin L. Hagenbeck, "Afghanistan: Fire Support For Operation Anaconda," 7

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V. CONCLUSION

Operation Enduring Freedom became the example of the ‘new’ model of warfare, according to its proponents, of how the United States will fight limited wars in the future. According to proponents of the new model of warfare, the United States needs only a few soldiers on the ground coordinating the overwhelming fire provided by the U.S. Air Force. The model further argues that artillery is obsolete, because air power provides heavier firepower more accurately in support of ground forces, is more mobile and is less vulnerable, since it can operate from outside the combat zone. Dr Biddle’s paper challenges this view, arguing that the Afghanistan campaign was an example of orthodox theater warfare.¹¹¹ As a test for the continuing relevancy of artillery in limited conflicts, Operation Enduring Freedom proved to be a good test. The new model argues that air support was all that was needed. In Afghanistan, the Air Force had no other competing missions.¹¹² On numerous occasions air power proved unavailable or unable to support ground maneuver forces. Ground commanders still need fire support systems that are under their control to ensure responsive fire support. Even when the commander has control of his air support, there are times when the commander needs weapons with small burst radii to limit effects to the enemy. This demonstrates the continuing relevance of ground based fire support.

At the same time, artillery is widely perceived to be becoming irrelevant. This stems from the ongoing attempt by the United States Army’s Field Artillery branch to compete with the U.S. Air Force in providing massive firepower in combat. The cancellation of the Crusader artillery system serves as a reminder that artillery needs to focus more on supporting the maneuver commander and less on competing with the Air Force to provide massive fire support. Prior to the end of the Cold War, the Field Artillery evolved towards providing more firepower. The Field Artillery branch needs to evolve in a new direction, towards providing better support to the maneuver commander.

¹¹¹ Stephen Biddle, *Afghanistan And The Future Of Warfare: Implications For Army And Defense Policy* (Carlise, PA: Strategic Studies Institute, U.S. Army War College, 2002), 1-58

¹¹² The Taliban’s air force and anti-aircraft capabilities had largely been destroyed by the time U.S. ground forces arrived in Afghanistan.

The Air Force has struggled to be independent as a branch for much of its early history. This has worked to the advantage of the United States because the first and most important mission of the Air Force is to dominate the airspace over the countries at war. The value of airspace domination lies in the uses that control of the air can provide, reconnaissance, transportation, close air support and the ability to deny these advantages from the enemy. Once the Air Force achieves that domination, it needs to be flexible enough to take advantage of its airspace dominance. Until the Air Force chooses to increase the priority of the close air support mission, the new model of warfare will never be fully validated. To improve its ability to provide close air support, those air elements providing the support to ground forces will have to accept a subordinate role to the ground forces. This idea of subordination works against the concept of independence that the Air Force campaigned for, which has impacted its willingness to provide responsive close air support.

Close air support has become a very important part of fighting limited wars. Since World War II, the United States began to substitute firepower for maneuver as a means of limiting casualties in limited conflicts. Though the United States has always sought to employ massive, overwhelming firepower, the Korean War became the first war where the maneuver force did not seek to destroy the enemy but to identify the enemy for destruction by artillery and close air support. This has driven the artillery's efforts at providing artillery pieces that can provide more and heavier fire support. This has been fueled by the perception that the United States is casualty averse.

The 1990s led to some changes in U.S. warfighting doctrine. The desire to avoid collateral damage and friendly casualties has led the United States to an increasing reliance on precision guided munition which seeks to limit the effects of firepower to the target. The paradigm changed 'Bigger' firepower is no longer necessarily better. To minimize collateral damage, commanders seek to limit destructive effects to just the target. Since artillery and mortars are predominantly perceived to be area fire weapon systems, this has raised the question of artillery and mortars relevance.

The new head of the National Guard, Lieutenant General Steven Blum, stated “that artillery units might no longer be needed because of improvements in precision guided munitions.”¹¹³ The National Guard Chief based his opinion on the belief that the United States has to transform its military to fit the new model of warfare. The new model of warfare argues that the military needs to be able to deploy faster and that by relying on the Air Force, the Army can transform into a lighter more deployable force. Under that assumption, the 10th Mountain Division did not bring its artillery with the task force that deployed to Afghanistan. During Operation Anaconda, situations arose where air power was unavailable or unable to support the ground maneuver forces. Deploying light artillery would have provided the maneuver commander with a reliable source of dedicated fire support. Dr. Biddle concludes that the campaign in Afghanistan should not be used as a template to transform the military. He argues that Afghanistan was not a change in the warfighting doctrine paradigm or a unique case, but an example of joint warfare employing maneuver supported by firepower. Afghanistan proved to be an aberration in that there were few strategic targets for the Air Force, resulting in the Air Force focusing on close air support.¹¹⁴ Gulf II has already shown the Afghan model only works when no other targets are available. Ground units occasionally had to wait until they became a priority.¹¹⁵ The objective of the recent ‘Shock and Awe’ bombing campaign by the Air Force against Iraq was to convince the Iraqis that resistance was futile. The air campaign effectively destroyed much of the Iraqi military forces facing the U.S. ground forces, but did not psychologically break the Iraqis, because the Iraqis expected to face overwhelming airpower. While it helped the ground campaign by destroying Iraqi Forces, the bombing failed to break the Iraqis’ will to resist, even though the Iraqis were helpless against the Air Force. The Iraqis’ will to resist only collapsed when M1A2 Abrams and M3A2 Bradleys drove through Baghdad with impunity.¹¹⁶

¹¹³ James Dao and Eric Schmitt, “New National Guard Chief Calls For A More Agile Force,” *New York Times*, 17 May 2003, Downloaded from Earlybird database on 21 May 2003

¹¹⁴ Stephen Biddle, *Afghanistan And The Future Of Warfare*, 1-58

¹¹⁵ BBC News, “Iraq Air Support ‘Failed UK Troops’,” *BBC News*, 26 May 2003, Downloaded on 26 May 2003 from <http://news.bbc.co.uk>

¹¹⁶ Eric Schmitt, “Top General Concedes Aerial Bombardment Did Not Fully Meet Goal,” *New York Times*, 26 March 2003, Downloaded from the Earlybird database on 26 March 2003

Though artillery remains relevant, it needs to change. The Field Artillery has focused on the deep fight and larger, heavier artillery pieces. Targets that require massed fires from multiple artillery units to destroy are usually either slow moving or very large and visible. The Air Force has repeatedly demonstrated that it can eliminate targets that are visible or slow moving. By developing howitzers, like the Crusader, capable of providing more massive firepower in competition with the Air Force's ability to engage these targets, the artillery fuels the belief that it is becoming irrelevant. The Air Force has the ability to deliver more firepower than the field artillery and can always deliver more firepower when it wishes. An A-10 ground attack fighter can carry 16,000 pounds of external ordinance per sortie, the equivalent of 160 155mm high explosive (HE) shells, and a B-52D can carry 70,000 pounds of conventional bombs per sortie, the equivalent of 700 155mm HE shells. Both aircraft have the capability of employing precision guided munitions.¹¹⁷

Dominance of airspace has rightly been the Air Force's primary mission and should remain the primary mission. But once it has seized control of the air, the Air Force needs to put the control of the air to good use. The main value of control of the air is the ability to use control of the air to influence ground combat. Initially, the air campaign over Afghanistan focused on targets that did not support the Northern Alliance. Within a few days the Air Force began to have difficulties finding targets worth bombing. This caused some angst at the national level, because it gave the impression that little progress was being made. Once ground forces were introduced, the ground forces began to provide targeting information, allowing the Air Force to provide close air support. The transition to providing close air support enabled the Northern Alliance to go on the offensive, leading to the Taliban's downfall.¹¹⁸

¹¹⁷ Bill Gunston, *Modern Military Aircraft* (New York, New York: Crescent Books, 1977), 64 & 110 and *FM 6-40, Field Artillery Manual Cannon Gunnery*, (Washington D.C.: Department of the Army, 23 April, 1996), pg. 7-5

¹¹⁸ Bob Woodward, *Bush At War*, 210-313

For the Air Force, the close air support mission has historically been a low priority. The Air Force needs to implement certain changes to improve its delivery of close air support. The current fighter jets in use, with the exception of the A-10, fly too fast to be able to acquire and engage targets in close proximity to friendly ground troops. The bombs used are often too big and there are seldom enough trained personnel certified to coordinate air strikes.

The Air Force Special Operations Command has begun to examine increasing the number of personnel attending schools. Increasing the number of enlisted terminal attack controllers (ETAC) and ground forward air controllers (GFAC) will improve the availability of close air support. Still, the Army often employs platoons on dispersed operations over large areas in limited conflicts as an economy of force. The U.S. Army's Field Artillery Branch already has a structure assigned to the platoon level of ground maneuver units in place. By developing a program to certify forward observers in coordinating precision aerial delivered munitions, ground maneuver units to the platoon level would then have the ability to get air support as needed.

To improve availability of close air support, the Air Force needs to keep its fleet of ground attack aircraft. Currently, the Air Force is examining whether to decommission its last eight squadrons of A-10s. The other options the Air Force is examining for the close air support mission are the F-16 and the F-35, when it becomes available.¹¹⁹ The Air Force designed both aircraft for aerial combat and the ability to engage ground targets is a secondary consideration. Due to the cost of the F-35, the Air Force will probably not want to risk it being damaged by ground fire, which will force the aircraft to engage ground targets from high altitudes. This will limit the accuracy of the close air support unless the Air Force employs precision-guided munitions.

The precision-guided munitions employed by the Air Force are too large; the JDAM can only be mounted on the 1,000-pound and 2,000-pound bombs. This is economical, because the JDAM costs \$14,000. This compares favorably with the cost of

¹¹⁹ Robert Coram, "The Hog That Saves The Grunts," *New York Times*, 27 May 2003, Downloaded from Earlybird database on 27 May 2003

a high explosive 155mm artillery round which costs approximately \$500 and is only 100-pounds. It requires 10 or 20 artillery rounds to equal the explosive punch of a single JDAM. The problem with large bombs is that the burst radius is so large that they cannot be employed near friendly troops, which is where close air support is often needed. The Air Force has begun to develop smaller precision-guided bombs that can be employed in the proximity of ground troops.

The Field Artillery Branch has also begun to develop a precision-guided artillery round utilizing global positioning system technology. The GPS guided artillery, the Excalibur, will probably cost as much as the Air Force's new smaller version of the JDAM. Demonstrating that the artillery is still seeking to compete with the Air Force's strengths of precision fire support.

A better objective of the Field Artillery Branch is to develop non-lethal artillery rounds that support the ground commander in limit conflicts. The artillery is developing artillery rounds that can disperse a crowd of demonstrators, immobilize vehicles and tag for identification rioters. By providing the maneuver commander with a range of capabilities, the artillery increases its relevancy.

The purpose of artillery is to support the ground maneuver commander. Over the last century, the Field Artillery Branch has gotten away from that mission. In order to remain relevant, the Field Artillery needs to once again focus on providing the maneuver commander with fire support. Artillery and mortars are still the only fire support assets available to the maneuver commander 24 hours a day in all weather conditions. Afghanistan tested whether maneuver could operate while relying exclusively on air support and it demonstrated once again that the commander has to have a fire support asset dedicated for his use as needed. For the foreseeable future artillery and mortars will fill that requirement.

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