

**Up in the Air:
A Question of Tactical Success of the USAAF in the Mediterranean and
European Theatres, 1942-44**

by
Cameron McKeigan

A Graduating Essay Submitted in Partial Fulfillment of the Requirements, in the
Honours Programme.
For the Degree of
Bachelor of Arts
in the
Department
of
History

The University of Victoria
28 March 2011

Table of Contents

Introduction.....	1
Chapter I.....	3
FLEDGLING WINGS: AIR POWER AND THE GREAT WAR	3
THE INTERWAR YEARS: US DOCTRINE AND INFLUENCES, 1919-42	7
Chapter II.....	15
A NATION EARNS ITS WINGS: THE USAAF IN NORTH AFRICA, 1942-43	15
Chapter III.....	29
PRACTICE MAKES PERFECT: THE USAAF IN SICILY AND ITALY, 1943-44	29
Chapter VI.....	46
SLOW AND STEADY: THE USAAF AND THE INVASION OF NORMANDY, JUNE-AUGUST 1944..	46
"BLITZ WARFARE, US STYLE:" VICTORY IN FRANCE, AUGUST -DECEMBER 1944	59
Conclusion	71
Bibliography	74

Not to have an adequate air force in the present state of the world is to compromise the foundations of national freedom and independence.

– Winston Churchill, 14 March 1933.¹

Introduction:

When examining the conflicts of the past 100 years, one cannot deny that the advent of the airplane revolutionized the methods by which war is waged. Aircraft have extended warfare to the third dimension, and control of the air has become as vital as control of the sea had been for the previous half-millennium. Arguably no conflict since the invention of the airplane highlights its importance as a weapon more than the Second World War (1939-45). Among the combatants at war's end, no nation boasted a larger or formidable air force than that of the United States. The United States Army Air Force (USAAF), though a latecomer to the war, gradually became the preeminent air force of the Allies, contributing significantly to both the strategic and tactical facets of the Allied war effort.

The USAAF's employment of tactical air support in the European theatre of the Second World War, despite dismal beginnings, evolved throughout the conflict to become an effective force in most cases, and a decisive factor in others. Beginning with a doctrine heavily modeled on the British Royal Air Force (RAF), the USAAF, through trial and error and further emulation of its British counterparts in North Africa, Italy and Northern France, eventually developed successful and devastating close-air support tactics. It was these improved tactics that greatly aided in the allied victory in all these theatres. In this thesis I shall outline the tactical doctrine, practices, and experiences of

¹ Henry Walker. *The Private Life of Henry VIII* (New York: I.B. Tauris & Co. Ltd., 2003), 57.

the USAAF during its operations in the Mediterranean and Northwestern Europe. I shall also seek to elucidate the evolution the doctrine that enabled the USAAF to become the lethal fighting force that would dominate the skies over Europe in 1944-45.

Chapter I: Fledgling Wings: Air Power and the Great War

By the outbreak of the Great War in 1914, the United States, birthplace of both general and military aviation, found itself vastly behind the major European powers in both technology and doctrine. Fueled by the rampant nationalism inherent in pre-war Europe, many of the powerful European states had invested heavily in the relatively new phenomenon of air power. To prevent national rivals from gaining the upper hand in its employment, these states began funding experimentation with military uses of the aircraft. Though the US Army did attempt limited experiments of its own, by 1914 it had spent no more than \$400,000 on its aviation service. In comparison, by 1914 Germany and France had each spent \$26 million, Russia had spent \$12 million, and England had spent nearly \$9 million.²

In response to the eruption of war in the summer of 1914, President Wilson declared a policy of neutrality. Despite close economic ties with several of the warring nations, Wilson believed, at least publicly, that the US could remain neutral in what was considered a European affair.³ As such, military spending in the US saw no dramatic increase from August 1914 to May 1917, and military aviation remained on the periphery of the US budget plans. As a result, when the US declared war on Germany in the spring of 1917, it was militarily unprepared for the nature of total war.

The effects of the Great War on air power, doctrine, and technology cannot be overstated. In just over four years, from 1914-1918, aircraft developed from slow,

² All figures in 1914 USD.

Walter J Boyne, *The Influence of Air Power Upon History* (Yorkshire England: Pen & Sword Aviation, 2005), 48.

³ Wilson's "neutrality" was heavily tailored towards the Entente Powers, as the US continued to trade with Great Britain, while raising little protest about lost trade between themselves and the Central Powers due to the British naval blockade of Germany.

Eric W. Osborne, *Britain's Naval Blockade of Germany, 1914-1919* (New York: Frank Cass, 2004), 78.

unarmed reconnaissance machines to fast, specialized, and heavily armed weapons of war. With the deadlock of trench warfare on the Western Front prevailing throughout the majority of the conflict, aerial reconnaissance became the only method with which to view the enemy's strength and positions. In order to keep their operations secret, it became necessary for air forces to intercept and destroy enemy reconnaissance aircraft, while protecting their own.⁴ Though the early aerial battles could be as haphazard as two opposing airmen firing revolvers at each other during reconnaissance missions, by early 1916, the progress of technology and doctrine saw the concept of "air power" firmly established. By the beginning of the battle of Verdun in February of 1916, specialized aircraft such as "fighters" and "bombers" jockeyed for "aerial superiority" over the skies of the Western Front.⁵

As the war progressed, so too did the roles of aircraft. Though the aircraft was primarily used for reconnaissance and interception, by war's end, aircraft were frequently being used for attacking enemy ground forces.⁶ By August 1918, during the Allied attack on Amiens, air squadrons were charged with the interdiction tasks of striking enemy airfields before the ground assault, and attacking rail depots, crossroads, and

⁴ Both sides placed emphasis upon obtaining air superiority over the battlefield in the hopes that once it was established, intense pressure could be placed upon the enemy's front lines via attack from the air. Boyne, *Influence of Air Power*, 80.

⁵ Sidney F. Wise, *Canadian Airmen and the First World War: The Official History of the Royal Canadian Air Force, Vol. 1* (Toronto: University of Toronto Press, 1980), 360.

⁶ As well as ground-attack, several aircraft were produced as 'bombers.' Though bombers did play a part in the air war of WWI, it was largely marginalized due to technological limitations. German zeppelins, one of the only models of aircraft at the time capable of long-range bombing missions, conducted several bombing raids on Allied cities during the course of the war. Though these raids proved terrifying to Allied civilians, they did not reduce the Allies' war-making capacity. Similarly, RFC conducted relatively large-scale bombing raids against the Zeppelin assembly lines and some German submarine pens. In retaliation of the German use of chlorine gas at Ypres in 1915, the French bombed the chemical plant from which the gas was believed to have originated. Overall, however, strategic bombing played a minor role in determining the outcome of the Great War. Boyne, *Influence of Air Power* 90, 99-102.

supply dumps to halt German reinforcement of the area.⁷ On the battlefield, aircraft were encouraged to strafe or bomb “targets of opportunity,” such as enemy troop formations and gun emplacements, and on more than one occasion, aircraft were credited with silencing the feared German 7.7cm anti-tank gun.⁸

The direct effect of the Great War on US aviation, however, was quite negligible. The US lacked any significant air power or doctrine of its own upon its entry into the Great War in 1917. Consequently, it relied on sending its pilots to train and fly with the British Royal Flying Corps (RFC, later to become the RAF) and the French *Aéronautique Militaire*. US pilots training with both the RFC/RAF and the *Aéronautique Militaire* began to adopt the British strategy of a constant offensive, regardless of losses, inadequate supplies, or level of experience.⁹ The US also resorted to borrowing combat aircraft from other allied air forces for their equivalent, the Aviation Section of the U.S. Signal Corps.

Despite being newcomers on the scene, the US Signal Corps, later to become the Air Service in the US Army, still managed to form its own aerial squadrons in early and mid 1918, albeit with mostly borrowed aircraft.¹⁰ One of the largest airborne operations of the war was in fact conceived and conducted by an American Chief of the Air Service in the American Expeditionary Force (AEF), Col. William “Billy” Mitchell.¹¹ In conjunction with the allied offensive at St. Mihiel, Mitchell commanded a massive air offensive. In the span of a week, over 1,400 allied aircraft flew nearly 2,500 sorties,

⁷ Wise, *Canadian Airmen*, 523.

⁸ *Ibid.*, 554.

⁹ Boyne, *Influence of Air Power*, 82.

¹⁰ The 103rd Pursuit Squadron was formed in February 1918, and the 96th Bombardment Squadron was operational by June 1918. *Ibid.*, 97.

¹¹ *Ibid.*, 97.

engaging enemy aircraft, ground troops, and artillery positions.¹² The allied offensive at St. Mihiel proved to be a success both on land and in the air, and established Mitchell as a premier American air power theorist.

To keep up with the war in Europe, the US itself quickly embraced air power, and became quite enthusiastic in aircraft production. By August of 1917, the US had requested permission to produce thousands of the Italian Caproni 450 and British Handley Page O/400 heavy bombers. Though the war ended before production could begin on a total war scale, the US was nonetheless able to produce several thousand aircraft and nearly fourteen thousand engines of foreign design.¹³ This American interest in air power was not, however, fated to last. As soon as the Great War was won, Congress drastically cut funding to the American aviation industry, as it did to all US military budgets. Total American military expenses dropped from \$952 million in 1919 to \$26 million in 1920, a figure that was to be halved by 1924.¹⁴ As a direct result of this, the Air Service saw its production of new aircraft shrink from 1,000 per month in 1918 to under a third of that in 1922.¹⁵ With funding cut, the US Air Service was again relegated to the periphery, and had it not been for the hard work of air power enthusiasts, such as Mitchell, would have returned to its pre-war state.

¹² Boyne, *Influence of Air Power.*, 97.

¹³ *Ibid.*, 98.

¹⁴ Figures in 1920 USD. *Ibid.*, 89.

¹⁵ Bernard C. Nalty, ed., *Winged Shield, Winged Sword: A History of the United States Air Force, Vol. 1* (Washington: Library of Congress, 1997), 78.

The Interwar Years: US Doctrine and Influences, 1919-42

Though the lessons of air power learned during Great War fell almost entirely on deaf ears in the US government, air power enthusiasts, many of whom had served in the Great War, managed to keep the floundering Air Service afloat in the wake of massive budget cuts. Arguably the loudest and most charismatic supporter of the continued development of air power in the early interwar period was the former commander of the AEF's air power during the war, Billy Mitchell. Surrounded by a loyal, competent staff, Mitchell returned to the US full of wartime experience and revolutionary ideas regarding the potential of air power. During and after the war, Mitchell's prestige meant that he was taken seriously by great European air power philosophers, such as Italian General Giulio Douhet, and Hugh Montague Trenchard, often called the 'Father of the Royal Air Force.'¹⁶

After the Great War, the Air Service's main role was still regarded by Washington to be observation of the US coastlines. Mitchell, quite convinced that his wartime experience had proved otherwise, lobbied the government to allow the Air Service to become its own separate wing of the military. Though Mitchell would not live to see this become reality, he nonetheless managed to convince his superiors that air power was vital to both the army and navy. As a result, a much-reduced air force survived the interwar period and provided the Air Service with the foundation of the doctrine it would carry into the Second World War. The first small victory of Mitchell's campaign was the creation of the Air Corps Tactical School (ACTS) in Langley, Virginia in 1920 by Maj. Gen. Charles Menoher, Chief of the Air Service.¹⁷ The creation of this

¹⁶ Boyne, *Influence of Air Power*, 143-4.

¹⁷ *Ibid.*, 144.

school, at the very least, indicates that the War Department recognized that aircraft could be tactically useful. The ACTS continued to operate until 1940, when it was replaced in 1942 by the Army Air Force School of Applied Tactics (AAFSAT).¹⁸

The formation of ACTS was not enough for Mitchell, however, and through bold claims to Congress that the air force had become more crucial to the military than a powerful navy, he was granted permission to perform demonstrations to prove his theories. The most famous of these tests was his attempt to destroy several decommissioned naval vessels from the air, including a captured German dreadnought, the *Ostfriesland*.¹⁹ So skeptical was the US Navy of his plan that they consented to the stunt, believing, as US Secretary of war Newton D. Baker scoffed, the “idea is so damned nonsensical and impossible that [he would be] willing to stand on the bridge of a battleship while that nitwit trie[d] to hit it from the air.”²⁰ ‘That nitwit’ in fact managed to sink all of the targeted naval vessels, including the *Ostfriesland* over the course of a few days in July of 1921.²¹ Though skeptics of Mitchell’s theories remained, he had proven to the US government that air power could be an important factor in future wars.²²

Despite the success of the tests, the War Department did not view them as grounds for the creation of an independent air force, as Mitchell had hoped. Following his court-martial for openly criticizing senior members of the Army and Navy in 1925, Mitchell resigned from the service in February 1926, just before the Air Service was re-

¹⁸ Nalty, ed., *Winged Sword, Winged Shield*, 236.

¹⁹ Boyne, *Influence of Air Power*, 146.

²⁰ Roger Thompson, *Lessons Not Learned: The US Navy’s Status Quo Culture* (Annapolis: Naval Institute Press, 2007), 65.

²¹ Newton was, of course, not on board. Boyne, *Influence of Air Power*, 146.

²² Naval skeptics claimed that the damage done to the vessels would not have been as significant if they were moving, returning fire, or had crews on board to perform damage control procedures.

Nalty, ed., *Winged Sword, Winged Shield*, 95.

designated as the United States Army Air Corps (USAAC).²³ The end of Mitchell's career was not, however, the end of his ideas. Before his court-martial, Mitchell had inspired many of his contemporaries, such as General Henry H. "Hap" Arnold, to continue his campaign for the expansion of air power and an independent air force.²⁴

During the interwar period, the Air Service/USAAC once again fell behind its European contemporaries in both a technological and doctrinal sense. Advocates of air power, such as Mitchell and Arnold, realized this trend and lobbied the US War Department for increased funding for the purposes of research and development. In order to obtain that funding, USAAC drastically altered its air power theories in accordance to what it believed Washington wanted to hear, causing a dramatic departure in US air doctrine away from tactical air support. By the 1930s, Washington's defence policy was geared towards Hemisphere Defence. This policy stated that the largest threat to the US was an invasion by a belligerent through either Canada or a Central and South American state.²⁵ As such, the aircraft was viewed by the US military primarily as a defensive weapon, with its principal functions being reconnaissance, defence against enemy aircraft, and occasional long range offensive strikes.²⁶ In order to get funding, Air Corps officers stressed the importance of having both technically modern aerial superiority "pursuit" aircraft and long-range bombers.

²³ Mitchell openly accused his Army and Navy superiors of incompetence following the 1925 crash of the US dirigible *Shenandoah* in a storm over Ohio. Boyne, *Influence of Air Power*, 148

²⁴ Many of Mitchell's subordinates believed in his doctrine and managed to obtain fairly high-ranking positions in the Air Corps prior to WWII. The eventual USAAF and USAF General Henry H. ("Hap") Arnold was also greatly influenced by Mitchell's theories.

²⁴ Mitchell continued to lobby for a separate air force even as a civilian, but did not live to see his goal realized, passing in 1936, 12 years before the formation of the separate United States Air Force (USAF). Boyne, *Influence of Air Power*, 149.

²⁵ Daniel R Mortensen. *A Pattern for Joint Operations: World War II Close Air Support, North Africa* (Washington, DC: Library of Congress, 1987), 11.

²⁶ Morntensen, *Joint Operations*, 12.

The RAF also suffered from the British Parliament's budget cuts, in the interwar period, only remaining an independent force by marketing itself as a war-winning arm of the military. Leaders of the RAF claimed that strategic bombing could single-handedly win the next major war, if not providing a cost-effective deterrent of war.²⁷ London, agreeing that England's geography made it an ideal base for a large bomber force, provided the RAF with increased funding. Taking a page out of the RAF's book, Mitchell's early theories were modified, taking emphasis away from providing ground support and aerial interdiction, and placing it on the strategic bombing of the enemy's war-making capacity.²⁸

Washington, like London before it, finally was convinced of the utility of an air force, and granted limited funding for the development of heavy bombers and select pursuit aircraft for the purposes of Hemisphere Defence.²⁹ The late 1920s and early 1930s saw the USAAC use this funding to produce modern aircraft that strayed further and further away from the design of ground-attack, and instead could defend against enemy incursions into US airspace, and provide a strike force of strategic bombers.³⁰ Though the funding provided considerable opportunity for research and development, it did not allow for sustained production of any one model of aircraft. The result was a small air force in comparison to European contemporaries, particularly France, but one that was more dynamic in its development, putting little emphasis on tactical air support, but rather focusing on both pursuit aviation and strategic bombing, with considerably more stress on

²⁷ The RAF's struggle for continued funding and autonomy was led by Hugh Trenchard, and watched very closely by Mitchell and his supporters.

Tami Davis Biddle. *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1941-45* (New Jersey: Princeton University Press, 2002), 83.

²⁸ Nalty, ed., *Winged Sword, Winged Shield*, 96.

²⁹ Boyne, *Influence of Air Power*, 149.

³⁰ Nalty, ed., *Winged Sword, Winged Shield*, 85.

the latter.³¹

Throughout the 1930s US aviation produced a hodgepodge of aircraft, with differing levels of utility. The Boeing B-17 Flying Fortress and B-24 Liberator, for example, were among the cutting edge of heavy bombers in any air force, while the Northrop A-17, Curtiss P-36 Hawk and the Navy's Brewster Buffalo could not compete with current European fighters.³² Indeed, the best aerial superiority fighters the USAAC/USAAF could field upon its entry into the war were the Curtiss P-40 Warhawk, and the Bell P-39 Aircobra, which could not match their contemporaries' speed or maneuverability.³³ At the same time, the newly formed German *Luftwaffe*, boasting the revolutionary Messerschmitt Me-109 fighter, quickly proved its dominance in the Spanish Civil War of 1936-39. During this time, the RAF introduced the Hawker Hurricane and later, the Supermarine Spitfire to counter the Me-109. These aircraft enjoyed an advantage of sorts by undergoing their 'teething processes' in the early combat of the Second World War. Through combat experience, European air forces came to understand that technology such as protective armor, self-sealing fuel tanks, and capable powerplants were vital to any combat aircraft. Though most this technology was largely adopted by the USAAC/USAAF prior to American entry into the war, US aircraft remained untested in combat until 7 December 1941. As a result, throughout the early years of the war, US pilots were often forced to develop combat tactics in order to make

³¹ Boyne, *Influence of Air Power*, 150.

³² *Ibid.*, 150.

³³ The P-40's rugged design and heavy armament did, however, lend itself adequately to the role of fighter-bomber, as discussed in Chapter II. The P-39 Aircobra, while not acclaimed by US airmen, served with distinction, and in great numbers in the USSR's Red Air Force. Some of the top-scoring Soviet aces in WWII flew the P-39, which, like the P-40, was ideally suited to ground-attack. Unlike the P-40, however, the P-39's design prohibited the fitting of bomb racks to the airframe, severely limiting its effectiveness in ground attack roles. Mortensen, *Joint Operations*, 38.

up for the shortcomings of their machines.

In the wake of developments in both Europe and Southeast Asia, US President Franklin Roosevelt realized that another major war was a possibility, and instituted an extensive rearmament program, in response to the Munich Crisis of 1938.³⁴ On 14 November 1938, Roosevelt called a meeting of US military leaders in Washington, including Generals Malin Craig, Army chief of staff, George C. Marshall, deputy chief of staff, and Hap Arnold, chief of the Air Corps.³⁵ As a result of this meeting there was a massive increase in military spending by the US in what was to become Roosevelt's rearmament program. By the time fighting broke out in Europe in September 1939, the US output of military aircraft was just over 2,100 per year: half of Japan's, a quarter of Germany's, and a third of Britain's.³⁶ To remedy this, Roosevelt called for the production of 50,000 aircraft within the first year of the implementation of his rearmament campaign, and drastically increasing numbers in the following years.³⁷ Although he would later admit that the figure "had come out of the air" and demanded an impossible feat, such a figure demonstrated Roosevelt's resolve to avoid the unpreparedness that plagued the AEF throughout its campaigns from 1917-18.³⁸ The US War Department finally granted the USAAC the funding needed to develop better quality aircraft in larger quantities, both by improving the existing airframes of machines like the P-40, and by the design and production of all-new prototypes able to compete with the most modern European and Japanese models.

As well as the improvement of its numerical and technical strength, the USAAC,

³⁴ Nalty, ed., *Winged Sword, Winged Shield*, 231.

³⁵ Mortensen, *Joint Operations*, 9.

³⁶ Nalty, ed., *Winged Sword, Winged Shield*, 231.

³⁷ Boyne, *Influence of Air Power*, 150.

³⁸ Nalty, ed., *Winged Sword, Winged Shield*, 233.

renamed the United States Army Air Force (USAAF) in June of 1940, implemented considerable doctrinal advances. The successes of the Germans' tactical employment of the *Luftwaffe* in their *Blitzkrieg* strategy and the RAF's pursuit methods during the Battle of Britain directly challenged the prevalent interwar belief that "the bomber will always get through." As the war progressed, it became increasingly apparent that a conflict of this scale could not be won through bombing alone. Although strategic bombing still played a significant role in the theory of the USAAF, the above battles convinced the Americans that a well-developed tactical strategy was also a necessity in modern total war.

Once again, the USAAF looked to the RAF for examples of effective tactical air power doctrine. Borrowing heavily from existing RAF doctrine, the USAAF developed Field Manual (FM) 31-35 in April 1942.³⁹ Though the content of FM-31-35 was meant to replace the outdated and ambiguous doctrine of previous USAAF field guides, only 10 of its 65 pages were devoted to the primary methods and procedures regarding successful ground attack.⁴⁰ Furthermore, like its predecessors, the doctrine of FM 31-35 was itself untested in battle. By the first American combat operations in North Africa during Operation Torch in November 1942, the British and the RAF in Egypt and Libya had gained nearly two years of experience fighting the Axis in the desert. In that time, RAF and British Army commanders had developed their own variations of tactics for the effective employment of close air support, which differed from their written doctrine.⁴¹ Unlike the RAF, however, USAAF doctrine was not based on its own battle experience

³⁹ The actual doctrinal practices of FM 31-35 will be discussed in the next chapter. Paul Johnston. "The Question of British Influence on U.S. Tactical Air Power in World War II." *Air Power History* 52, no. 1 (2005): 24.

⁴⁰ Johnson, "Question of British Influence," 24.

⁴¹ *Ibid.*, 29.

and had not been modified in any way by observing the British experience in the Middle East and North Africa, a mistake that would prove costly in the opening days of America's North African campaign.

Chapter II: *A Nation Earns its Wings: The USAAF in North Africa, 1942-43*

In June of 1942 US President Roosevelt and British PM Winston Churchill agreed that a major ground campaign against the Axis forces was necessary. Eventually agreeing that their forces were neither adequate nor prepared to assault Hitler's Atlantic Wall in Northwestern Europe, the two leaders approved a joint Anglo-American landing in North Africa. At this time, the British Eighth Army, under Field Marshall Bernard 'Monty' Montgomery, was locked in a fierce struggle with Erwin Rommel's Afrika Corps, in its attempts to push through Libya and Egypt to capture the oil fields of the Middle East. The objective of these landings, code named Operation Torch, was to liberate sections of North Africa held by Vichy French forces, and catch Rommel's Afrika Corps in a pincer between the Torch landing forces and the British Western Desert Force.⁴²

As the majority of the landing forces were to be American, the Combined Chiefs of Staff appointed US General Dwight 'Ike' Eisenhower as Supreme Allied Commander of the Torch invasion.⁴³ Ground forces were to be separated into British and American task forces, with each possessing an accompanying air force. As Supreme Commander of the Allied forces, Eisenhower also gained *de facto* control of the hastily formed US 12th Air Force that would be attached to the US landing forces.⁴⁴ Eisenhower, realizing the crucial role that air power could play in such a campaign, supported both the close air and interdiction roles that the 12th Air Force could provide, and allowed it to be divided into components: the XII Bomber Command, XII Fighter Command, and XII Air Support

⁴² Mortensen, Daniel R. *A Pattern for Joint Operations: World War II Close Air Support, North Africa* (Washington, DC: Library of Congress, 1987), 50.

⁴³ David Syrett, "The Tunisian Campaign," in *Case Studies in the Development of Close Air Support* (Washington, DC: Library of Congress, 1990), 162.

⁴⁴ The US 12th Air force was primarily formed by Hap Arnold's stripping of fighter, light bomber, and even a few heavy bomber squadrons from the US 8th Air Force based in England, combined with fresh, undertrained airmen from the US. Mortensen, *A Pattern for Joint Operations*, 51.

Command.⁴⁵ Hindering the 12th Air Force's full effectiveness, however, was the unresolved issue of how tactical air power should be employed on the battlefield.

Before the war, the issue of who was to have ultimate control over air power in combat had been fiercely debated among air and ground commanders. Advocates of the AAF favoured the centralization of air power in order to take advantages of its fluidity, mobility, and flexibility as a striking force. Ground commanders, on the other hand, feared that a centralized chain of command would create immense delays in the dispatch of potentially critical close air support.⁴⁶ By the entry of the US into the war, this debate had not been solved, and standard US doctrine, embodied in its latest installment, FM 31-35, attempted to seek a compromise on the issue. Although FM 31-35 emphasized the importance of cooperation between the air and ground forces of the army, as well as the importance of aerial superiority over the battlefield, it was cumbersome and ambiguous regarding command structure.

By the protocol of FM 31-35, a request for air support by a ground unit first had to make its way, via radio and the chain of command, to an "Air Support Party" at the divisional level. There, an AAF officer would relay the request to, and advise, a ground commander who in turn would either approve or deny the request. If the request was approved, it was then radioed to an "Air Support Control" unit, operating at the Corps level. Once again, an AAF officer would assess the request and consult with the corps commander. Only if the corps commander, a ground officer, approved of the request was the message sent to US airfields and a subsequent mission ordered.⁴⁷ In short, ground

⁴⁵ Mortensen, *A Pattern for Joint Operations*, 52.

⁴⁶ Michael Bechthold. "A Question of Success: Tactical Air Doctrine and Practice in North Africa, 1942-3." *The Journal of Military History* 68, no. 3 (2004): 828-30.

⁴⁷ Syrett, "The Tunisian Campaign," 156.

commanders did have final say in the allocation of air power resources, but could be – and were – influenced heavily at all levels of command by their AAF counterparts. The final say accorded to ground commanders was quickly exploited by the Army, greatly hindering the USAAF air effort in the early stages of the campaign.

Though the doctrine for close air support outlined in FM-31-35 bore striking resemblance to its British counterpart, Training Instruction No. 6, a crucial difference between the two in the autumn of 1942 was that the latter had been battle-tested and consequently modified by the RAF's Desert Air Force (DAF) and the British Eighth Army in Africa.⁴⁸ Failing to see this, and in an attempt to reduce the ambiguity of FM 31-35, Eisenhower's chief of staff Brigadier General Walter Bedell Smith, issued "Combat Aviation in Direct Support of Ground Units" just before the Torch landings were to take place.⁴⁹ This directive, aimed at decreasing FM 31-35's ambiguity, effectively placed the direct control of US air power in the hands of ground commanders at levels as low as the division, and sometimes the brigade.⁵⁰ Smith's memorandum, days before the operation was scheduled to begin, essentially granted US field commanders their own personal air forces, greatly limiting the authority of the AAF officers. The result was a parceling of USAAF air power to individual divisional ground commanders who were relatively unfamiliar with the concepts and capabilities of US air power, which was to prove nearly disastrous in the coming campaign, as discussed below.⁵¹

The Torch landings took place on 8 November 1942, with US forces landing in Task Group West at Casablanca in Morocco and Task Group Centre near Oran, Algeria.

⁴⁸ Bechthold, *Question of Success*, 834.

⁴⁹ *Ibid.*, 835.

⁵⁰ *Ibid.*, 836.

⁵¹ *Ibid.*, 830.

Both American and British troops composed Task Group East, which landed just outside of Algiers. Met by little resistance on the part of the Vichy French, most of the Allied objectives fell within the first two days of the campaign.⁵² During this period of time, air action was considerably light, and because of logistic issues preventing the delivery of army aircraft, Navy pilots in support of the invasion carried out the majority of air missions.⁵³ For the purpose of the invasion, air units were split by nationality, with the RAF supporting Task Group East, and the USAAF, commanded by Major General James Doolittle, supporting the Western and Central Task Groups.

Alerted to a new hostile presence on the continent, German and Italian commanders in Tunisia immediately reinforced and moved and moved their troops eastward, securing several all-weather airfields and launching a counter-attack to stop the allies from capturing the vital port of Tunis. Original Allied plans had called for the their forces to capture Tunis and Bizerte from the Axis forces, denying their access to Tunisia's major port cities. The Allied failure allowed the Axis to establish and supply a defensive line in Tunisia, which was eventually further strengthened by Rommel's forces retreating eastward from Libya in January of 1943. The fierce fighting that followed the initial Torch landings exposed fundamental flaws in US air-ground coordination and led to the modification of US air doctrine into the groundwork for its successful employment in Italy and Northwestern Europe.

Within the first skirmishes between US and Axis forces, ground commanders quickly assumed complete control of the air power attached to their units and proceeded to limit its potential effectiveness. Due to the Allied failures both to prevent the German

⁵² Mortensen, *A Pattern for Joint Operations*, 57.

⁵³ *Ibid.*, 56.

forces from capturing or constructing several Tunisian all-weather airfields, and to initially construct adequate airfields of their own, the *Luftwaffe* enjoyed a considerable advantage. Airfields the Allies did manage to capture or construct were neither as numerous nor as near the front line as those of the *Luftwaffe*, putting them "in the remarkable position of fighting on an equality, if not possessing tactical air superiority."⁵⁴ USAAF fighters and bombers had, once airborne, a much longer distance to fly in order to reach the front lines and return, draining a considerable portion of their fuel, and subsequently, the amount of time they could remain operational over the battlefield. Furthermore, due to overcrowding at the few airfields the US did possess, flights of aircraft could not land, refuel, rearm, and take off as quickly or efficiently as their adversaries.⁵⁵

This *de facto* aerial superiority both caused and extenuated several problems facing the USAAF in the early days of the campaign. Unaware that in Tunisia, according to British Lt. Gen. K.A.N. Anderson, "the rains began in early December and continued until early April" and created a "peculiar glutinous mud," the Allies were completely unprepared for the possibility that their airfields were "liable to become unserviceable at very short notice after heavy rains."⁵⁶ As well as a shortage of serviceable airfields, the US flyers and ground crew found themselves desperately lacking supplies, as the weather conditions also wreaked havoc on the only existing rail line to the Allied front lines in Tunisia.⁵⁷ An example of this took place at the American airfield at Thelepte, where for

⁵⁴ Syrett, "The Tunisian Campaign," 161.

⁵⁵ In the early stages of the campaign, the Allies only possessed five all-weather airfields, a fraction of the number controlled by the *Luftwaffe*. *Ibid.*, 161.

⁵⁶ *Ibid.*, 161.

⁵⁷ Syrett, "The Tunisian Campaign," 161.

over a month aircrews were reduced to cannibalizing parts from damaged aircraft and spent British fuel tanks in order to repair less damaged aircraft.⁵⁸

Damaged aircraft, as opposed to supplies, were quite abundant. The USAAF entered the North African theatre unprepared for an aerial war against Germany. Their primary fighter aircraft, the P-40 Warhawk, while ruggedly built and heavily armed, was no match for the *Luftwaffe's* Bf-109 in a dogfight. According to Maj. Philip Cochran of the USAAF 58th fighter squadron, unless a flight of P-40s enjoyed a 3:1 advantage in numbers over Bf-109s, an engagement between the two would almost certainly result in heavy American losses.⁵⁹

The inability to achieve aerial superiority was not the only woe of the USAAF. With the deadly German 88mm multi-purpose gun hampering any advance of the US Army ground forces, several airstrikes were ordered against the German emplacements. The A-20 Havoc, B-25 Mitchell, and B-26 Marauder twin-engine light-medium bombers were the USAAF workhorses of these early and ultimately ill-fated instances of close air support. Excellent light-medium bombers in their own rights, they nevertheless took heavy losses, unable to operate effectively in an area where withering German antiaircraft (AA) fire and the deadly Bf-109 of the *Luftwaffe* remained supreme.⁶⁰ In order to reduce the losses of its bomber forces, the USAAF attempted to use P-40s as fighter-bomber

⁵⁸ *Ibid.*, 162.

⁵⁹ *Ibid.*, 168.

⁶⁰ German forces in North Africa were equipped with a myriad of AA weaponry that ranged from 20mm and 38mm rapid-fire cannons mounted on half-tracks, to the 88mm flak cannon. German troops were able to employ these guns with lethal effectiveness, especially during the early stages of the Tunisian campaign, when allied air tactics had not evolved to challenge this threat. Bechthold, *Question of Success*, 835.

aircraft, a practice that Montgomery's Western Desert Force had adopted for the P-40.⁶¹ In theory, with its smaller size, durable airframe, and faster airspeed, the P-40 would be less vulnerable to the enemy guns and fighters. Problems immediately surfaced, however, as many P-40 aircraft in North Africa were not equipped with bomb racks for carrying ordinance, and US fighter pilots had little prior experience in attacking ground targets.⁶²

Far and above the largest issue for the USAAF in the early stages of the campaign, however, was the clumsiness of the US Army and its commanders in their first taste of combat. Unable to grasp the strengths and limitations of air power, several ground commanders took to the approach of inefficiently employing their parceled air units, courtesy of Smith's "Combat Aviation in Direct Support of Ground Units." Ignoring FM 31-35's mandate that achieving aerial superiority should be the air force's primary objective in any given campaign, ground commanders began to use their air power reserves almost exclusively to cover their forces. Allied commanders, in the planning of the North African campaign had not expected much resistance from the *Luftwaffe*, and had thus not equipped their ground forces with sufficient AA weaponry. As a result, German fighters and dive-bombers regularly harassed ground forces.⁶³ To combat these attacks, ground commanders insisted on having constant air cover for their troops. This practice, termed the 'air umbrella,' placed Allied air forces in a purely defensive role, and due to its heavy drain on airpower resources, effectively limited the USAAF to this role.⁶⁴

⁶¹ The P-40 also saw service in great numbers with the RAF under the designation "Kittyhawk." Possessing a fighter that could challenge the Bf-109, the Spitfire, RAF forces under Montgomery employed the Kittyhawk primarily as a fighter-bomber. Syrett, "The Tunisian Campaign," 160.

⁶² Bechthold, *Question of Success*, 835.

⁶³ *Ibid*, 836.

⁶⁴ Mortensen, *A Pattern for Joint Operations*, 69.

The air umbrella was ineffective, inefficient, and greatly opposed by the officers and airmen of the USAAF and RAF.⁶⁵ Due to the proximity of *Luftwaffe* airfields to the battlefield, German aircraft had only to wait until the USAAF fighters had expended their brief loiter time over the battlefield before they could once again harass Allied ground forces unopposed. These tactics allowed the *Luftwaffe*'s obsolete dive-bomber, the Ju-87 Stuka to reassume its former duty as a front-line aircraft. Though the Stuka was determined outmoded over two years prior, during the Battle of Britain, the abysmal state of Allied air power and AA weaponry in North Africa allowed it to be used effectively in the gaps between Allied umbrellas.⁶⁶ To make matters worse, the withdrawal of the *Luftwaffe* during USAAF patrols allowed German AA units to fire at any aircraft in the sky without worrying about shooting at friendly planes.

The dedication of the USAAF to its defensive umbrella also meant that very few aerial interdiction missions, such as attacks on *Luftwaffe* airfields aimed at destroying enemy aircraft on the ground, were flown in the early stages of the campaign. If interdiction missions were flown, they were once again ordered by ground commanders who were inexperienced in the methods of air power. One of the most famous examples of this situation occurred in December of 1942, when a ranking ground commander in the British Army sent a squadron of twin-engine RAF Bristol Bisleys on an unescorted daylight raid on a nearby Stuka base despite vehement opposition from RAF aircrews.

⁶⁵ Though Montgomery's Western Desert Air Force (DAF) had developed relatively successful close air support doctrine by the winter of 1942, it was largely on an *ad hoc* basis, and was not official RAF doctrine. As a result, the RAF units attached to the British Army in the battle for Tunisia employed, for the most part, identical tactics to those of their American allies. Bechthold, *Question of Success*, 838.

⁶⁶ Between 25 November and 12 December 1942, *Luftwaffe* aircraft, including Stukas, flew over 800 sorties against the frontline Allied troops. *Ibid.*, 837.

Like the American A-20, the Bisley was extremely vulnerable without adequate fighter cover, and all ten aircraft failed to return from the raid.⁶⁷

By the end of December 1942, the Allied drive in Tunisia had ground to a halt, and it had become clear to Eisenhower that fundamental changes in the Allied battle strategy, including air power, were in order. After consulting the top British and US air force officers, Air Chief Marshal Sir Arthur Tedder and General Doolittle, Eisenhower came to the conclusion that Allied air power needed reorganization and a much higher degree of centralization.⁶⁸ After a series of meetings with Churchill, Roosevelt, and the Allied Chiefs of Staff throughout December 1942 and January and February 1943, including the Casablanca Conference from 14-24 January, Eisenhower significantly altered the command structure of the Allied air forces in North Africa.

By 16 February 1943, an official reorganization of the Allied air forces was complete and would survive intact for the remainder of the Mediterranean campaign. This new order placed all Mediterranean air operations under the command of Tedder, with US Major General Carl A. Spaatz controlling the North African Air Force (NAAF).⁶⁹ The NAAF was in turn divided into the Northwest African Strategic Air Force (NASAF) under Doolittle, the Northwest African Coastal Air Force, under British Air Vice-Marshal Hugh P. Lloyd, and the Northwest African Tactical Air Force (NATAF). Chosen to lead the NATAF was British Air Vice-Marshal Coningham, a pioneer of the *ad hoc* relationship between the DAF and British ground forces in Montgomery's Western

⁶⁷Syrett, "The Tunisian Campaign," 164.

⁶⁸Bechthold, *Question of Success*, 838.

⁶⁹Mortensen, *A Pattern for Joint Operations*, 74.

Desert Force which had begun to employ relatively successful close air support in Egypt and Lybia.⁷⁰

In a speech given in recently liberated Tripoli, Libya, at a conference held to announce the new structure of command to the Allied armies, Coningham laid down what was to become the foundation of Allied tactical air doctrine for the remainder of the war.⁷¹ Included in Coningham's speech were the assertions that "The Army fights on a front that may be divided into sectors, such as Brigade, Division, Corps or an Army front. The Air front is indivisible."⁷² Perhaps most importantly, Coningham stated that "in this technical age it needs a life of study and specializing for a sailor, a soldier or an airman to learn his profession," and "no soldier is competent to operate the Air, just as no Airman is competent to operate the Army."⁷³ Aside from the structure of command in the air forces, what Coningham advocated in his speech did not differ markedly from the doctrine of FM 31-35. What gave Coningham's words the credibility they enjoyed was simply that his methods had proven effective in battle.

Upon taking command, Coningham quickly revised the doctrine and priorities of the NATAF from a defensive role to an offensive one. Coningham put to rest the air umbrella tactics, and instead called for attacks on the *Luftwaffe* both in the air and on the ground. In addition to this, Coningham dictated that in the ground attack role, fighter-bomber pilots were only to attack troop concentrations, supply dumps, and lightly armored motor transport. Tanks and heavily fortified gun emplacements were not to be attacked regularly, as they proved too difficult to destroy without expending exorbitant

⁷⁰ Bechthold, *Question of Success*, 839.

⁷¹ *Ibid.*, 840.

⁷² *Ibid.*, 840.

⁷³ *Ibid.*, 841.

amounts of fuel, ammunition, and time.⁷⁴

This new Allied air force command structure was not without its own teething process. On 19 February 1943, just as the structure was being implemented, Axis columns under Rommel launched a large-scale offensive against the US II Corps at Kasserine Pass in the attempt to split Eisenhower's Tunisian forces.⁷⁵ Though II Corps had been forewarned, the speed and ferocity of the attack caught the defenders by surprise, and in just over a day, Rommel's forces had pushed nearly thirty miles past the pass, capturing the forward Allied airfields, and countless American vehicles and field guns left behind in the retreat.⁷⁶ In the wake of this offensive, nearly every Allied combat aircraft within range was called upon to attack Rommel's advancing army, including heavy B-17 and B-24 bombers. Allied air power, however, was greatly impeded by Rommel's capture of several forward airfields, and poor weather conditions. As a result, many aircraft were employed in roles for which they were not designed, having little influence on the battle.⁷⁷ By 25 February, Rommel's forces, encountering stiffer Allied resistance and artillery, and running desperately short on supplies, ended the offensive, eventually being pushed back behind the pass from whence he came.

After the crisis at Kasserine had been averted, Allied air power went to work bringing the battle to the *Luftwaffe* and hammering German supply lines and troop formations on their way to the front. Bolstered by new shipments of P-40s from the US, equipped with bomb racks, the NATAF now had a sizeable fighter-bomber force. In addition to the acquisition of more fighter-bombers, the new Allied air command

⁷⁴ Bechthold, *Question of Success*, 843.

⁷⁵ Syrett, "The Tunisian Campaign," 70.

⁷⁶ Mortensen, *A Pattern for Joint Operations*, 70.

⁷⁷ Bechthold, *Question of Success*, 844

structure divided its units along functional, rather than national lines, as had been practiced in the early stages of the campaign. A practical result of this was the cooperation of both RAF Spitfires and USAAF P-40s on the battlefield, with P-40 pilots being tasked with attacking ground forces, and the Spitfires protecting the P-40s from Bf-109s. In addition to the Spitfires, some squadrons were equipped with the new US P-38 Lightning, a heavily armed, twin-engine fighter that could also stand up to any adversary the *Luftwaffe* could muster in North Africa.⁷⁸

During February and March of 1943, few sorties were flown in direct support of ground operations by the NATAF, as Coningham directed his squadrons against the aircraft of the *Luftwaffe* and other interdiction targets, with great success.⁷⁹ On 22 March, the NAAF declared it had aerial superiority, despite the presence of over 400 enemy aircraft in Tunisia. Between 29 March 22 April, NASAF bombers averaged an impressive 997 sorties per day against enemy airfields and communication centers.⁸⁰ By April, the Allies were once again on the offensive, and had begun employing air power as part of their offensive doctrine. At El Hamma, USAAF and RAF fighter-bombers and medium bombers served as part of a massive bombardment against the formidable German Mareth defensive line. From 3-9 April, NAAF forces flew nearly 3,000 sorties against the line, dropping over 1.5 million pounds of bombs. From 4-5 April alone, the NATAF flew over 800 sorties over Tunisia, while NASAF bombers dropped nearly 2.4 million pounds of bombs on Tunisian and other Mediterranean targets.⁸¹ In addition, the NAAF in its

⁷⁸ Syrett, "The Tunisian Campaign," 163.

⁷⁹ Ibid., 178.

⁸⁰ Aerial superiority, in this sense, meant that the *Luftwaffe* could no longer dictate where and when Allied air power could be employed, and not that it had been obliterated altogether. Ibid, 179.

⁸¹ Syrett, "The Tunisian Campaign," 181.

entirety claimed 134 enemy aircraft shot down.⁸²

In mid-April, as the Allies pushed forward to the last Axis strong points of Tunis and Bizerte, Allied aircraft of the NAAF led the way, flying 5,000 sorties against enemy positions and airfields, forcing all but a skeleton force of *Luftwaffe* aircraft to be pulled to Sicily and Italy to preserve their numbers.⁸³ The final Allied push, beginning on 22 April and lasting until 13 May, saw both Tunis and Bizerte fall to British and US forces, during which time the NAAF claimed 273 enemy aircraft shot down, and nearly 600 abandoned by Axis forces as they fled to Italy.⁸⁴

Behind the scenes of these successful battles was a new Allied appreciation of the necessity of forward airfields. Eager to avoid the fiascos of late 1942 or Kasserine Pass, Allied engineers continuously constructed forward airfields, ensuring that their airmen wasted no time in getting to and from, or rearming for, the battle. In November of 1942, the Allies had in their possession only five all-weather airfields. By the conclusion of the Tunisian campaign, that number had skyrocketed to nearly 100, thanks in large part to nearly 9,000 engineers of the AAF.⁸⁵ The USAAF and RAF also benefited from the construction of basic radar installations throughout the campaign, greatly increasing the ease with which fighter squadrons could be coordinated.⁸⁶

Despite abysmal beginnings in November of 1942, the USAAF air campaign in North Africa ultimately proved to successful, albeit at a considerable cost. The USAAF, with its previously untested FM 31-35, went through a particularly painful teething process, but with some guidance from the British DAF and Vice-Marshal Coningham,

⁸² Syrett, "The Tunisian Campaign," 181.

⁸³ *Ibid.*, 182.

⁸⁴ *Ibid.*, 183.

⁸⁵ *Ibid.*, 161.

⁸⁶ Mortensen, *A Pattern for Joint Operations*, 83.

earned its stripes in the field of battle. The doctrine established by the NAAF and NATAF would lay the groundwork for both the British and American tactical air doctrine for the remainder of the war, and serve as the foundation of what was to become the US FM 100-20, sometimes referred to as the AAF "Declaration of Independence."⁸⁷ Published on 21 July 1943, FM 100-20 became available to Army and airmen alike, just after the Allies began a new offensive against the Axis on the shores of Sicily.

⁸⁷ FM 100-20 will be discussed in the next chapter.
Bechthold, *Question of Success*, 149.

Chapter III: *Practice Makes Perfect: The USAAF in Sicily and Italy, 1943-44*

Following the successful conclusion of the North African campaign in May of 1943, the Allies were determined to keep pressure on the Axis forces. Reasoning that Allied forces were still not prepared to invade Northern France, the British and Americans in Africa turned their eyes northward, towards Sicily and the Italian peninsula. Allied commanders believed that the presence of their armies on Italian soil would shatter the increasingly fragile alliance between Italy and Germany, knocking Italy out of the war and leave Germany to fight on two fronts without her principle ally.⁸⁸ With a large amount of Allied troops, aircraft, and equipment already stationed in the Mediterranean, an attack on Sicily would require minimal preparation.

Throughout the Sicilian and Italian campaign, several weaknesses in the USAAF tactical doctrine and practices developed in North Africa became apparent. Although the tactical employment of air power had improved drastically since the early days in Tunisia, as historian Harry Coles points out, "is it obvious that at the time of the Sicilian campaign, much remained to be done in the improvement and coordination and techniques in air operations in close support of ground forces."⁸⁹ Allied victory in Sicily was almost immediately followed up by an invasion of the Italian mainland, well before the newfound shortcomings of the tactical air forces could be effectively addressed. As the Italian campaign progressed, however, the USAAF and its British counterpart, as in

⁸⁸ Though the Americans wished to attempt an invasion of Northern France at this time, the British resisted, using the failed raid on Dieppe in August of 1942 as an example of the current Allied inability to assault Hitler's Atlantic Wall. The eventual Allied decision was to pursue the Italian campaign, however, priority was given to the planning of, and build-up of forces for the invasion of France. This was to greatly affect the forces of the Italian campaign, as discussed below.

Alan F. Wilt, "Allied Cooperation in Italy and Sicily," in *Case Studies in the Development of Close Air Support* (Washington, DC: Library of Congress, 1990), 195.

⁸⁹ Taken from a postwar AAF study. Harry L. Coles, "Participation of the Ninth and Twelfth Air Forces in the Sicilian Campaign," *USAF Hist Study #37* (Washington, DC: Library of Congress 1945), 185.

North Africa, developed effective techniques and doctrine that would prove invaluable not only to the Allies in Italy, but in the coming invasion of France in mid-1944.

The attack on Sicily was launched 10 July 1943 by the US Seventh and British Eighth Armies, which landed on the beaches in the southeast.⁹⁰ Supported by overwhelming naval and air superiority, Allied troops quickly established a foothold on the island, and began to press inland. By the eve of 16 August, Allied forces had surrounded the remaining Axis forces on the island at Messina, most of which were evacuated to the Italian mainland that night, leaving the island in Allied hands on the morning of the 17th.⁹¹ Although the Allies were unable to prevent the Axis evacuation, allowing thousands of troops to be redeployed in the defence of the Italian mainland, in their haste the retreating Axis left behind a wealth of vehicles, weaponry and supplies, including no less than 1,100 aircraft.⁹²

Absent from the success of Allied efforts in Sicily was a definitive contribution by its tactical air forces, which had recently been renamed the Mediterranean Allied Tactical Air Force (MATAF).⁹³ Although on the surface air power appeared to have made a major contribution, closer inspection reveals that there were a number of factors that prevented this. The hesitancy of recently empowered AAF officers to participate in joint operations, distance from the battlefield, chaotic communication systems, the fluidity of invasion warfare, and several occurrences of friendly fire plagued the AAF throughout the Sicilian campaign. Though some of these factors, such as distance to the battlefield, were easily

⁹⁰ Wilt, "Allied Cooperation in Italy and Sicily," 199.

⁹¹ *Ibid.*, 199.

⁹² *Ibid.*, 199.

⁹³ MATAF, the new name for the former North African Tactical Air Force (NATAF), consisted of the Tactical Bomber Force, the British Desert Air Force (DAF), and the US XII Air Support Command (XII ASC). Major James F. Sunderman, ed., *World War II In the Air: Europe* (New York: Bramhall House, 1953), 144.

resolved as advancing Allied ground troops captured enemy airfields, others, such as frequent friendly fire incidents, proved much more difficult to remedy.⁹⁴

In the early stages of the invasion, Allied fighter-bombers were forced to fly from bases in Malta, Gozo, Pantelleria, and Tunisia, as the ground forces had not yet secured airfields on the island.⁹⁵ Command of the aircraft was at first designated to the Fighter Control Centers (FCC) aboard Allied ships stationed off the Sicilian coast. As the landings proceeded, that command was streamlined by Air Support Parties (ASP) equipped with radar and radios, that would go ashore once the beach was secure, and have a much clearer idea of battlefield conditions, and roles aircraft could play in them.⁹⁶ Unfortunately, Allied planners did not factor in the havoc that Sicily's mountainous terrain would wreak on their radio and radar signals, and as a result, many of the relatively untrained ASPs that went ashore were unable to properly communicate with their aircraft.⁹⁷ As a result, in the first 48 hours of the invasion, no sorties were flown in direct support of the landing troops, for fear of attacking friendly troops who had advanced past the positions last known by the FCC. Allied aircraft instead were directed to enemy communication centers, transportation, and airfields.⁹⁸

In addition to communication problems, AAF air support was hindered by overcompensation by Allied air commanders, now in full control of their forces.⁹⁹ Wary

⁹⁴ Shortly after the beginning of the Sicilian campaign, the US Joint Chiefs of Staff (JCS) published FM 100-20, which placed the command of all tactical air assets firmly in the hands of Allied air commanders. FM 100-20 also stated that the first priority of any tactical air force in any given theater was to achieve aerial superiority over its opponents, via air-to-air combat and interdiction, prior to engaging in any ground-support roles. Bechthold, *Question of Success*, 848.

⁹⁵ By D-day + 9, no fewer than 25 tactical squadrons were based in Sicily, thanks to hard fighting and the capture of enemy airfields by Allied forces. Wilt, "Allied Cooperation in Italy and Sicily," 201.

⁹⁶ *Ibid.*, 199.

⁹⁷ *Ibid.*, 199.

⁹⁸ Wilt, "Allied Cooperation in Italy and Sicily," 199.

⁹⁹ Bechthold, *Question of Success*, 847.

of repeating mistakes made in North Africa when ground commanders controlled air power, commanders of the air forces refused to participate in joint operations with the Army and Navy, instead placing all of their focus on achieving aerial superiority over the *Luftwaffe*.¹⁰⁰ Though this approach was recommended by existing AAF doctrine, air commanders failed to accurately assess the strength of their opponent, and devoted far more resources to the pursuit of aerial superiority. By the time of the invasion, the *Luftwaffe* was only able to muster 275-300 sorties per day, in comparison to the Allies' 900-1100.¹⁰¹ As it became apparent that Sicily would fall to the Allies, this number dropped dramatically, as remaining fighter aircraft were flown to Italy to keep them out of Allied hands. Regardless of the enemy's strength, AAF commanders continued to overemphasize their pursuit of aerial superiority, sending their aircraft on interdiction missions against *Luftwaffe* bases, and only attacking enemy ground forces when necessary.¹⁰²

When attacks were launched against enemy ground targets, another issue emerged as a serious hindrance to the effectiveness of tactical air power: the high probability of friendly fire. Due to the fluidity of invasion combat, it was impossible for FCCs, and later ASPs – if their equipment was in order – to keep airmen informed of the location of friendly and enemy troops. Early Allied operations also lacked the necessary coordination between ground and air forces that allowed for a universal system of recognition. As a result, friendly fire incidents occurred frequently during the Sicilian campaign. US

¹⁰⁰ Wilt, "Allied Cooperation in Italy and Sicily," 200.

¹⁰¹ At least half of the sorties flown by the *Luftwaffe* were flown at night, so as to avoid interception by numerically superior Allied fighters. *Ibid.*, 200.

¹⁰² *Ibid.*, 199.

General Omar Bradley personally witnessed a flight of A-36 Invaders¹⁰³ of the USAAF attack a column of his tanks, despite their release of yellow smoke, a signal that was supposed to identify them as “friendlies”. In defence, the tanks fired at their attackers, damaging one and causing the pilot to bail out. When soldiers of the recently attacked unit recovered the downed airman, they were shocked to find that the pilot’s squadron was never made aware that friendly units would be marked by yellow smoke.¹⁰⁴ On another occasion, the British XXX Corps headquarters was bombed by a flight of A-36s that had mistaken them for a German position they were supposed to bomb in support of troops attacking Troina.¹⁰⁵ These examples of friendly fire highlight a costly Allied oversight. A lack of a universal system of identification that allowed ASPs and the fighter-bomber pilots themselves to differentiate from friend and foe proved to be a drastic oversight, one which was not extensively dealt with until well after the invasion of the Italian mainland.

Friendly fire incidents, however, did not only come from above. On 13 July, gunners on an Allied naval vessel mistook a flight of US C-47 transports for German aircraft and opened fire. The transports were actually laden with troops and supplies for an airborne operation that was being carried out simultaneous to the amphibious landings. Seven of these C-47s were downed by friendly fire.¹⁰⁶ This incident, and ones like it, convinced the Allies that “distinctive markings” on their aircraft were necessary during

¹⁰³ The North American A-36 Invader was a variant of the P-51 Mustang airframe that had been modified to include dive breaks, making it the only dive-bomber to serve in significant numbers with the USAAF. Most historians agree that this aircraft proved unsatisfactory in its role, and there are numerous accounts of A-36 aircraft having their dive breaks wired shut in order to be able to serve as a regular fighter-bomber.

Ian Gooderson, *Air Power at the Battlefield: Allied Close Air Support in Europe 1943-45* (Portland: Frank Cass, 1998), 60.

¹⁰⁴ Gooderson, *Air Power at the Battlefield*, 49.

¹⁰⁵ *Ibid.*, 49.

¹⁰⁶ Sunderman, ed., *World War II in the Air*, 142.

any major joint invasion operation, a realization that was to have iconic implications in future campaigns.¹⁰⁷

All in all, the Sicilian campaign had been a disappointing one for the tactical air forces of the USAAF. Allied air commanders, empowered by the newly-issued FM 100-20, overcompensated in their attempts to avoid a situation like the one they faced in North Africa prior to the reorganization of February, 1943. Hindered by logistics, a poor communication system, and reoccurring instances of friendly fire, the MATAF played a minor role in the swift Allied victory in Sicily. Indeed, their greatest accomplishment in the campaign remains the suppression of the *Luftwaffe* based on the island, at best a broken force even before the invasion began. Like North Africa, however, the Sicilian campaign exposed fundamental flaws in the techniques and doctrine of the Allied tactical air forces, flaws which were again highlighted – and dealt with – during the invasion of Italy.

The Allied assault on the Italian mainland, launched across the Strait Messina on 3 September 1943, hardly left time to remedy the inefficiencies of the Allied tactical air forces that had been exposed in Sicily. It did however, offer Allied commanders an opportunity to both improve their air forces on the fly, and demonstrate that lessons learned in Tunisia had not been forgotten.¹⁰⁸ Resistance encountered immediately after the landings was relatively light, and Allied troops made good progress north, until a fierce German counterattack on the 12 September. Four days earlier, the Italian government, no longer under dictator Benito Mussolini, had announced an armistice with

¹⁰⁷ This will be discussed in greater detail in the following chapter. *Ibid.*, 142.

¹⁰⁸ Pun fully intended.

the Allies, ending Italy's participation in the war.¹⁰⁹ The Germans, however, after disarming the Italian armies, remained as an occupation force and continued to fight the Allies for every inch of Italian soil. Even in the face of German resistance, the Allies continued their push, with US troops landing at Salerno on 9 September and Allied airborne units easily securing Corsica by early October. By mid-October, the three large ports of Naples, Taranto, and Bari as well as the two largest aerodromes in Southern Italy, at Foggia and Naples were in Allied hands, and out of the range of German artillery.¹¹⁰

The early stages of this invasion saw tactical air power play a similarly inefficient role as in the Sicilian campaign. A small improvement in operations came when Allied air commanders conceded that the *Luftwaffe* posed no real threat during this leg of the invasion, and began allocating more resources to ground-attack and interdiction sorties.¹¹¹ Prior the capture of air complexes at Foggia and Naples, however, Allied aircraft were still forced to fly long-range missions from Sicilian air bases. Admittedly, fighter-bombers could increase their time over the battlefield from 30 minutes to one hour by carrying drop-tanks of fuel, but such a measure drastically limited the amount of ordinance they could carry for attacking German ground units.

Air power's effectiveness was also limited by the still-inexperienced ASPs, and the mayhem caused by the mountainous Italian landscape on both their perception of the battlefield, and their equipment. In a prime example of early Allied blunders, in the first few days of the Salerno landings an ASP dispatched three squadrons of fighters to investigate a reported raid north of the beachhead. In so doing, he had mistakenly left no

¹⁰⁹ Wilt, "Allied Cooperation in Italy and Sicily," 201.

¹¹⁰ *Ibid.*, 201.

¹¹¹ *Ibid.*, 202.

cover for the Allied naval vessels offshore, which were promptly attacked, along with the beach, by low-flying enemy aircraft.¹¹² Shortly thereafter, when containing the German counterattack of 12-16 September, Allied air commanders were forced to employ not only fighter-bombers, but medium and heavy bombers as well, in an operation reminiscent of the Kasserine fiasco nearly a year previous.¹¹³

Perhaps surprisingly, it was only after the Allied push north became bogged down that marked improvement was made to the employment of tactical air power. Determined to keep Allied forces, particularly strategic bombers, as far away from Germany as possible, Hitler ordered the formation of a series of formidable defensive lines stretching across the Italian peninsula. The defensive lines took advantage of Italy's mountainous terrain, which heavily favoured the defender, and were arranged in such a way that an Allied breakthrough at any point could not be exploited without encountering yet another line. By the late fall of 1943, the Allied offensive had stalled on the particularly well-fortified Gustav line, resulting in a "slow and dreary battle up the Italian peninsula" that would come to characterize the entire campaign.¹¹⁴

During this stall, several important changes took place in both the command structure and the techniques of the Allied air forces. Generals Eisenhower, Spaatz and Doolittle, as well as Air Chief Marshal Tedder and Air Marshal Coningham were recalled to England to begin preparations for the Allied assault on Northern Europe, scheduled for mid-1944.¹¹⁵ Replacing Eisenhower as the Supreme Allied Commander was Field Marshall Sir Henry Maitland Wilson. The combined air forces in the Mediterranean

¹¹² Wilt, "Allied Cooperation in Italy and Sicily," 202.

¹¹³ Sunderman, ed., *World War II in the Air*, 144.

¹¹⁴ Wilt, "Allied Cooperation in Italy and Sicily," 205.

¹¹⁵ Sunderman, ed., *World War II in the Air*, 144.

became the Mediterranean Allied Air Force (MAAF), led by US General Ira Eaker. The tactical wing of the MAAF, the MATAF, under US General John K. Cannon, consisted of the US XII ASC¹¹⁶, and the British DAF.¹¹⁷ The changing command of the MATAF did not greatly affect existing Allied doctrine, as Cannon was well-liked, and generally agreed with Coningham with regards to the roles of tactical air power.¹¹⁸

The greatest improvement to the Allied employment of the MATAF, however, came in its reform of the air control process. The halt in sustained mobile operations during the winter of 1943-44 allowed Allied air and ground commanders to establish adjacent headquarters and meet each evening to discuss the next day's air missions.¹¹⁹ In the USAAF, these missions were divided into either "pre-planned" or "request" and "call" missions.¹²⁰ At the meetings of AAF and ground commanders, request missions that had been made by ground commanders at least 24 hours in advance were assessed and either approved or denied, depending on existing AAF resources. In this process, AAF officers were given the final say. If approved, AAF squadrons carried out the missions the following day, with pilots being briefed with the latest maps, aerial photographs, information on weather, enemy defences and positions, and the location of friendly troops with regards to a 'bomb safety line' (BSL).¹²¹

¹¹⁶ This was renamed the US XII Tactical Air Command in April 1944, in large part because AAF commanders wished to remove 'support' from their operations.

Wilt, "Allied Cooperation in Italy and Sicily," 198.

¹¹⁷ *Ibid.*, 196-7.

¹¹⁸ *Ibid.*, 197.

¹¹⁹ *Ibid.*, 206.

¹²⁰ Johnston, "The Question of British Influence," 25.

¹²¹ A BSL was a series of distinguishable landmarks, or coloured smoke visible from the air along the front lines of the battlefield, placed roughly 1,000 yards ahead of friendly troops. Upon seeing this line, AAF airmen could be sure that any forces beyond it were the enemy, and could attack without the risk of friendly fire incidents. After the frequent occurrences of friendly fire in Sicily, Allied commanders stressed the importance of clear communication between ground and air forces to ensure that BSL information was kept strictly up to date. Wilt, "Allied Cooperation in Italy and Sicily," 207.

Call missions, on the other hand, were requests for immediate air strikes, received by radio, and were structured to take advantages of targets of opportunity.¹²² Expanding on the system that had existed since the latter half of the Tunisian campaign, Allied air commanders would receive the request from an ASP close to the front, and determine if it was a viable target. Unlike the Tunisian campaign, however, variations of this process quickly developed in attempts to cut down on the response time of Allied aircrews. One such system was the AAF adoption of the British ROVER DAVID system, which was renamed ROVER JOE.¹²³ By the ROVER system, ASPs were granted a Forward Attack Control (FAC) officer, usually an experienced pilot, who was located in a concealed position overlooking the front lines.¹²⁴ Equipped with a radio, the FAC was able to communicate with the fighter-bombers as they carried out their missions.

Further improvements of ROVER JOE were quickly implemented by resourceful troops on the front lines. As the Allies had achieved complete aerial superiority over the *Luftwaffe* by early 1944,¹²⁵ the skies became clear for airborne artillery spotters flying the slow, unarmed Stinson L-5 Sentinel observation aircraft.¹²⁶ With an unobstructed view of the battlefield, radio operators of the L-5s began contacting FACs on the ground, and having them direct Allied fighter-bombers to targets well beyond the range of Allied

¹²² Johnston, "The Question of British Influence," 25.

¹²³ *Ibid.*, 20.

¹²⁴ *Ibid.*, 21.

¹²⁵ By 31 December 1943, the *Luftwaffe* had only 147 operational planes to the Allies' 3,000-4,000. Of those 147, only 88 were fighters and fighter-bomber aircraft, capable of challenging their Allied counterparts. This number was to increase to 459 operational aircraft during the German counterattacks at Anzio and the Gustav line in February, 1944. *Luftwaffe* 'strength' was short-lived, however, falling to a handful of captured Italian aircraft in July of 1944, as all German fighters were called back to defend the Reich against the Allied invasion of France. Wilt, "Allied Cooperation in Italy and Sicily," 214.

¹²⁶ The L-5 was at first used as an aerial spotter for Allied artillery, and for short-range reconnaissance. Equipped with a radio, and not much more, this aircraft could only be employed by the Allies if no enemy aircraft were available to oppose it.

Ibid., 208.

artillery, and out of the FACs' field of view. By mid-1944, the AAF had adopted an official variation of this technique, called "Horsefly," whereby AAF squadrons would possess their own L-5 aircraft, which would be flown by both a ground commander and an FAC in direct radio contact with Allied fighter-bombers.¹²⁷ This procedure was particularly useful against hidden and moving targets, greatly decreased the incidences of friendly fire, and was used from the breaking of the Gustav line in the spring of 1944, to the surrender of the Germans in Italy in May of 1945. It is worth noting that even though the presence of the *Luftwaffe* was a moot point for the majority of the Italian campaign, Allied aircraft were often subjected to withering German AA fire, at great cost. Regardless of the aerial superiority the Allies enjoyed during the entire campaign, an average of 200 aircraft were lost per month.¹²⁸

A final adaptation to the ROVER/Horsefly systems was the modified reintroduction of the ill-fated air umbrella used in the early stages of the Tunisian campaign. Called CABRANK, this system greatly reduced the amount of time between a call request and an air strike on the target. By CABRANK, small flights of Allied aircraft would be sent over the battlefield, and remain overhead, out of the range of enemy AA fire, unless directed to attack a target by an FAC. If no suitable targets presented themselves during their loiter time, fighter-bomber pilots were permitted to fly behind enemy lines, seeking targets of opportunity.¹²⁹ Flights were timed so that as each circling flight ran out of fuel, another would arrive to take its place. This procedure, though similar to the air umbrella that proved so costly in Tunisia, was only carried out in areas where the threat from the *Luftwaffe* was negligible. Unlike the air umbrella, CABRANK

¹²⁷ Wilt, "Allied Cooperation in Italy and Sicily," 218.

¹²⁸ *Ibid.*, 214.

¹²⁹ Johnston, "The Question of British Influence," 27.

emphasized the offensive advantages of tactical air power, rather than using aerial resources for the defence of ground troops.

It was at this time, during the stalemate of 1943-44, that the USAAF also began to fly armed reconnaissance missions.¹³⁰ A practice long employed by the RAF, armed reconnaissance differed from close air support or interdiction, in that pilots were often not assigned specific targets, but sent carrying ordinance deep into enemy territory, where they would both perform aerial reconnaissance, and search for targets of opportunity on which to expend their ammunition. 'Armed recce' posed a greater risk for the fighters, as the chances of them encountering enemy fighters or flak batteries greatly increased in proportion to the amount of time spent over enemy territory.¹³¹ Despite this, the tactical benefits outweighed the risks, as armed recce flights stood a better chance of catching unsuspecting German troops out in the open, and could both gather information about and destroy enemy forces. On occasion, armed recce flights were specifically timed so that an unarmed Allied reconnaissance aircraft would also be flying over enemy territory and, just as in Horsefly, could direct fighters to particularly opportune targets. This procedure became known as "Pineapple."¹³²

Tactics such as ROVER JOE, Horsefly, armed recce, and CABRANK greatly reduced the average time between a call request being made, and the subsequent air strike. In Tunisia 1943, USAAF officials estimated that a response to a call request usually took upwards of 80 minutes, a number that was reduced to as low as 20 minutes

¹³⁰ Johnston, "The Question of British Influence," 25.

¹³¹ Fighter-bomber losses during armed recce missions were proportionally higher than close air support missions. This will be discussed in more detail in the following chapter.

Gooderson, *Air Power at the Battlefront*, 221.

¹³² Wilt, "Allied Cooperation in Italy and Sicily," 218.

by late 1944.¹³³ Despite their overall success, the above tactics still could not completely address the issue of friendly fire, especially during mobile operations, where the BSL could shift by the minute. Though these systems offered a great improvement, incidences of friendly fire continued throughout the Italian campaign, and were of great concern to Allied commanders during the invasion of France.¹³⁴

Improvements in technique were also aided by improvements in technology. During the fall and winter of 1943-44, USAAF squadrons began to be equipped with the Republic P-47 Thunderbolt fighter aircraft. Originally designed to escort the heavy bombers of USAAF Eighth Air Force over Germany, the "Jug" as it was affectionately known by its pilots, became the premier fighter-bomber of the USAAF for the remainder of the war.¹³⁵ The P-47's air-cooled radial engine and rugged design allowed it to take staggering amounts of punishment, even compared to the P-40, and continue flying. Boasting a top speed of over 400mph, a bomb load of 2,000lbs, a 250 mile operational radius when fully-loaded, and eight .50 calibre wing-mounted machine guns, the P-47 was a formidable ground-attack aircraft, and more than capable of defending itself against *Luftwaffe* interceptors, including the fearsome Focke Wulf FW-190.¹³⁶ By 1945, American fighter-bomber squadrons in MATAF were almost exclusively equipped with P-47s.¹³⁷

¹³³ Johnston, "The Question of British Influence," 28.

¹³⁴ Friendly fire in France will be discussed in the following chapter.

¹³⁵ Wilt, "Allied Cooperation in Italy and Sicily," 212.

¹³⁶ *Ibid.*, 212.

¹³⁷ Gooderson, *Air Power at the Battlefield*, 61.

As the winter of 1943-44 progressed, the Allies found themselves unable to break the Gustav line, despite several massive assaults.¹³⁸ Even an amphibious assault at Anzio in an attempt to flank the line in January was contained by the determined German defenders. In the wake of these heavy losses, Allied commanders decided to launch a massive aerial interdiction campaign, aimed at cutting the German lines of supply from Northern Italy to the Gustav line. Appropriately named Operation Strangle, the campaign begun on 19 March, and continued to 13 May 1944.¹³⁹ Despite flying over 50,000 sorties against rail lines, motor convoys, marshalling yards, and supply depots, the MATAF was not able to successfully cut off the German troops south of Rome.¹⁴⁰ This failure was largely attributed to a lack of coordination between the ground and air forces. Allied intelligence estimated that the Gustav line could remain sufficiently supplied until the Italian rail network was reduced to 7% of its peacetime capacity.¹⁴¹ In actuality, the Germans could have stayed well supplied with the rail capacity functioning at only 2% of its peacetime potential.¹⁴² In practice, the destruction of 98% of Italy's rail lines proved too daunting a task for the MATAF, which was unable to stop the flow of supplies to the Gustav line. Furthermore, even though the amount of German supplies, such as fuel and ammunition, did drop during Strangle, no major Allied offensives occurred during the operation, allowing the Germans to stockpile such material.¹⁴³ As long as the Allied ground troops remained dormant, any fuel and ammunition delivered to the entrenched

¹³⁸ The most famous of these attempts occurred at Monte Cassino in March of 1944, when the US 5th army was repulsed by the Germans, despite attacking in the wake of a massive bombing campaign by heavy bombers of the USAAF 15th Air Force. Sunderman, ed., *World War II in the Air*, 145.

¹³⁹ *Ibid.*, 146.

¹⁴⁰ *Ibid.*, 146, Gooderson, *Air Power at the Battlefield*, 201.

¹⁴¹ Gooderson, *Air Power at the Battlefield*, 210.

¹⁴² *Ibid.*, 210.

¹⁴³ *Ibid.*, 211.

defenders was, in effect, extra. It was only when interdiction campaign was combined with Operation Diadem, a large-scale ground assault beginning on 11 May, that the Germans began using supplies faster than they could be delivered, and the Gustav line came under considerable pressure.

An additional military procedure that proved useful to the Allies in Italy was the commissioning of Operational Reports (OR).¹⁴⁴ These reports, carried out almost exclusively by British forces, analyzed the results of different combat tactics of the armies, navies, and air forces of the Allies just after the fighting had ceased, and could highlight inefficiencies, or make note of successes.¹⁴⁵ These reports had begun in North Africa, but were not used with any regularity until the Allied assault on the Italian mainland. Post-action ORs became a standard procedure during the Allied campaign in Northern France, and some valuable data was also collected regarding the Italian campaign. For example, a report that analyzed the effect of fighter-bomber attacks on German gun emplacements in a British sector of the front in Italy from October to December 1944 shone a favourable light on the effects of close air support. The report concluded that on average, for every 500 sorties flown against gun emplacements, 60-90 Allied soldiers' lives were saved for a loss of 2.6 pilots, 0.3 wounded, and 4.5 aircraft shot down.¹⁴⁶ Such figures demonstrated, then and now, that close air support did have a significant effect on the outcome of a battle.

By mid-May 1944, the Allies had successfully broken the Gustav line and relieved the troops at Anzio with a series of large-scale land offensives, backed by

¹⁴⁴ Wilt, "Allied Cooperation in Italy and Sicily," 219.

¹⁴⁵ Although the reports were carried out by the British, several reports offer valuable insight into the operations of the USAAF as well as the RAF. Wilt, "Allied Cooperation in Italy and Sicily," 219.

¹⁴⁶ *Ibid.*, 220.

withering air support.¹⁴⁷ On 4 June, Allied forces liberated Rome, two days before the landings at Normandy took place. Following the Normandy landings, it became painfully clear to the Allied forces in Italy that their theatre of war was not the first priority of the Allied JCS.¹⁴⁸ Despite playing second fiddle to the campaign in Northern and Southern France,¹⁴⁹ Allied forces continued to push northward, bringing the war in Italy to a close, with the last of the German forces surrendering on 2 May 1945.¹⁵⁰

The Allied air effort in Sicily and Italy continued the trend set in North Africa of improvement, achieved mostly on an *ad hoc* basis. As the campaigns in the Mediterranean unfolded, the USAAF became a more efficient and deadlier tactical force. Close air support procedures were streamlined with innovations such as ROVER JOE, Horsefly, and CABRANK, and were expanded beyond the front with the incorporation of armed recce and Pineapple. With the arrival of the P-47 in large quantities, the AAF came to possess a formidable aircraft, equally outstanding at ground-attack and interception. Coordination with ground forces also increased, as Allied air commanders became more and more willing to loosen their newfound grip on air resources, as allocated by FM 100-20. As cooperation improved, it was not uncommon for FACs on the ground to be experienced pilots, and Horsefly operations to include a ground officer present in the L-5 aircraft. Only the major issue of friendly fire remained, for the most part, unsolved. In static operations, such as the stalemate at the Gustav line, BSLs were often clearly

¹⁴⁷ Sunderman, ed., *World War II in the Air*, 146.

¹⁴⁸ Even prior to the Normandy landings, priority of troops and technology was given to the invasion forces. The equipment and men sent to Italy were not inferior by any means, only in quantity did the Normandy forces take precedence over those fighting in Italy.

Wilt, "Allied Cooperation in Italy and Sicily," 195.

¹⁴⁹ Elements of the MATAF were siphoned away to participate in the Allied Operation Dragoon, the invasion of Southern France on 15 August 1944. Some of these units returned to Italy in late 1944, others remained in Northern Europe for the remainder of the war. *Ibid.*, 198.

¹⁵⁰ *Ibid.*, 223.

defined, a luxury that all but disappeared when Allied forces went on the move. Overall, however, the USAAF that emerged from the Mediterranean was an effective tactical force. Lessons learned in North Africa and Italy were to forge the foundations of the tremendous success of Allied air power in Northern Europe.

Chapter IV: *Slow and Steady: The USAAF and the Allied Invasion, June-August 1944*

In the early morning of 6 June 1944 American, British, and Canadian invasion forces crossed the English Channel, landing on five beaches on the shores of Normandy in Northern France, in what remains the largest amphibious assault in history.¹⁵¹

Immediately preceding the amphibious forces, on the night of 5 June, was a massive airborne assault, which dropped nearly 24,000 Allied troops in the area immediately behind the landing areas. Operation Overlord, the much-anticipated Allied invasion of Northwestern Europe, had begun.

Air forces of the USAAF participated heavily in Allied operations during the months before Overlord, in the invasion itself, and the subsequent campaigns through France in the following months. The effects of Allied tactical air power, though perhaps exaggerated in the postwar era, nonetheless played a substantial role in the eventual Allied victory in the battle for France. As in previous campaigns, the tactical forces of USAAF faced a series of significant obstacles and made their share of blunders in the early days of the invasion. As the battle for France progressed, however, the AAF drew upon experience gained in the Mediterranean, quickly overcoming the majority of its obstacles, and evolving into a deadly effective force. By the end of the campaign in France, with Germany's fate was all but sealed, the AAF had become a formidable tactical force, feared by the Germans who encountered it, and respected by Allied air and ground forces alike.

The planning of Operation Overlord began in earnest following the Tehran Conference in late 1943.¹⁵² It was shortly after the conference that the Allied staff chosen to plan the invasion were assembled, resulting in the withdrawal of General Eisenhower,

¹⁵¹ Sunderman, ed., *World War II in the Air*, 260.

¹⁵² *Ibid.*, 251.

Spaatz, Doolittle, and Quesada, as well as Air Chief Marshal Tedder and Air Vice-Marshal Coningham, from their active duties in the Mediterranean December 1943 and January 1944. As in the Mediterranean, Eisenhower was named the Supreme Allied Commander of the invasion forces, and Allied air operations were mediated, but not commanded, by Tedder for the duration of the campaign.¹⁵³ In charge of tactical duties leading up to, during, and following the invasion was the Allied Expeditionary Air Force (AEAF) under Air Chief Marshal Leigh-Mallory, advised by Coningham, comprising of the US Ninth and the British Second Tactical Air Forces.¹⁵⁴ The Ninth Air Force, under the charge of US Major General Lewis Bereton, was eventually divided into the IX Tactical Air Command (TAC), XII TAC, XIX TAC, XXIX TAC, and IX Bomber command, under US Generals Quesada, Saville, Weyland, Nugent, and Anderson, respectively.¹⁵⁵ Occasionally during the battle for France the Eighth Air Force, a strategic force of heavy bombers under Lieutenant General Doolittle, was called to provide tactical air support, a role with which it was not familiar.¹⁵⁶

The Ninth Air Force's role in operation Overlord began well before Allied troops began crossing the Channel. Realizing that an amphibious assault without full aerial supremacy over the Channel and beachhead significantly reduced the chances of success, Allied planners set to the task of minimizing the *Luftwaffe* threat in 1943-44. This task

¹⁵³ Unlike the Mediterranean theatre, the campaigns in Northern Europe did not have a supreme Allied air commander. Largely due to personality conflicts and politics within the forces, Tedder was forced to act as a mediator and arbitrator between the Allied air forces in the theatre, not as a supreme commander. W.A. Jacobs, "The Battle For France," in *Case Studies in the Development of Close Air Support* (Washington, DC: Library of Congress, 1990), 240.

¹⁵⁴ Jacobs, "The Battle For France," 238.

¹⁵⁵ The US Ninth Air Force did not begin the invasion with so many different Air Commands. XIX TAC was created in late July to support the newly created Third Army, led by US General Patton. In mid August, the invasion of Southern France introduced XII TAC, previously stationed in Italy, to the theatre. Finally, XXIX TAC was created in late August to support General Simpson's Ninth Army. *Ibid.*, 238.

¹⁵⁶ The Eighth Air Force was used almost exclusively for the strategic bombing of targets in German-occupied Europe. Its tactical roles are discussed below. *Ibid.*, 239.

was largely accomplished by the Eighth Air Force, re-designated the United States Strategic Air Forces in Europe (USSTAF) in February 1944, over Germany. As the bombing of Germany intensified, long-range air-superiority fighter aircraft, primarily the P-51 Mustang, wreaked utter havoc on *Luftwaffe* forces attempting to attack the Eighth's bomber formations.¹⁵⁷ The Ninth Air Force played its part as well, flying interdiction missions against *Luftwaffe* bases in France, forcing some to be abandoned altogether as *Luftwaffe* commanders pulled their dwindling supply of aircraft out of harm's way. So confident were the Allies that the *Luftwaffe* could not oppose the invasion, that on the eve of D-Day, Eisenhower told his troops: "You needn't worry about the air. If you see a plane, it will be ours."¹⁵⁸

After the threat posed by *Luftwaffe* was neutralized, Allied commanders turned their attention to secondary objectives, such as the bombing of German rail lines, communication systems, radar installations, and gun emplacements in position to fire on the landing area.¹⁵⁹ Ninth Air Force squadrons primarily flew countless recce and armed recce missions, keeping track of the German Seventh and Fifteenth Armies that were expected to be the first to counterattack in the event of an invasion. These raids and recce missions were aimed primarily at hindering the German ability to quickly reinforce the

¹⁵⁷ For example, in early 1944 Allied strategic bombers began Operation Argument, an almost exclusive targeting the German aircraft industry. In a particularly successful week during Argument, from 20-25 February 1944, Allied fighter aircraft used the heavy bombers as bait to lure in *Luftwaffe* fighters, scoring 355 enemy fighters destroyed for a loss of only 33 of their own. Such operations were typical in the winter of 1943-44, but none as successful as what was to become known as "Big Week."
Sunderman, ed., *World War II in the Air*, 220.

¹⁵⁸ *Ibid.*, 259.

¹⁵⁹ The attacks on the French rail systems were carried out mostly by heavy bombers, and were of limited effectiveness.

Robert Vogel, "Tactical Air Power in Normandy: Some Thoughts on the Interdiction Plan," *Canadian Military History* 3, no. 1 (1994): 39.

area around the beaches when the invasion took place, allowing Allied troops to move inland before facing a consolidated counterattack.¹⁶⁰

On 6 June the troops went ashore, while overhead thousands of Allied aircraft of the AEAFF, USSTAF and their British counterparts, painted with "invasion stripes"¹⁶¹ flew tens of thousands of sorties in support of the landings.¹⁶² As in the Mediterranean, ground-attack missions were either considered as "pre-planned/request" or "call." The majority of missions flown by the Ninth Air Force were pre-planned interdiction flights for a number of reasons. The first reason was Allied planners possessed a wealth of information regarding enemy positions and routes of reinforcement, thanks in large part to the extensive recce sweeps made in the months leading up to the invasion.¹⁶³

Logically, Allied planners wished to use their aircraft to attack known targets such as German troop formations, gun emplacements, communication centers, and key routes – especially ones including bridges – of reinforcement.¹⁶⁴ Though most AAF squadrons were tasked with the above missions, the Ninth Air Force kept at least one fighter-bomber squadron on "air alert" patrol over each of the American beaches with the orders to attack targets of opportunity.¹⁶⁵

¹⁶⁰ The effectiveness of the pre-invasion attacks on interdiction targets is still of considerable debate. This chapter, however, will deal primarily with the actions of the Ninth during and after the invasion. Vogel, "Tactical Power in Normandy," 39.

¹⁶¹ To minimize the friendly fire incidents, all Allied aircraft, excepting the 4-engine heavy bombers, were painted with alternating stripes, three white and two black, on the top and bottom of each wing, and near the rear of the fuselage. These stripes were designed to be visible from both the air and the ground, preventing nervous AA gunners in the armada from accidentally shooting down their own aircraft. Sunderman, ed., *World War II in the Air*, 250.

¹⁶² *Ibid.*, 262.

¹⁶³ Jacobs, "The Battle For France," 254.

¹⁶⁴ *Ibid.*, 254.

¹⁶⁵ Several Allied fighter squadrons were also assigned to the aerial protection of the invasion armada, in the event of a significant counterattack by the *Luftwaffe*. No such counterattack occurred, as the *Luftwaffe* was far too depleted to attempt such a maneuver. Eisenhower had been correct in his assertion that any planes in the air were Allied.

A second reason why very little close air support was flown on D-Day came as an unfortunate surprise to the Allied landing forces. Like in the Mediterranean, aerial operations were primarily controlled by FCCs aboard naval vessels. American ASPs, including FAC officers were scheduled to go ashore once it was relatively safe for them to do so. Unlike Mediterranean operations, however, target selection had not been decentralized, and all call requests had to be processed and approved by the AEAJF joint-operations headquarters located in Uxbridge, England.¹⁶⁶

To make matters worse, ASPs were equipped with SR-284 radios, which had a maximum operational range of only 25 miles.¹⁶⁷ In order for ASP requests to be processed, they first had to be relayed by vessels of the invasion armada to the AEAJF HQ. In many cases, by the time a request had been made by the FAC, relayed to the ASP, relayed again by an Allied naval vessel, approved by the HQ in England, and relayed back to the fighter-bombers overhead, battlefield front lines and conditions had changed dramatically, greatly increasing the risk of friendly fire to an unacceptable level. Although some FACs were reportedly able to establish radio contact and "entreat" airmen directly into providing immediate support, the established system proved so inefficient that the first official instance of close air support called for by an assaulting regiment did not occur until 7 June (D-Day + 1).¹⁶⁸ The lack of air support calls made in the first two days of the invasion can also be attributed to the effective support provided by the invasion armada itself, which was able to bombard most enemy targets within a few miles

Jacobs, "The Battle For France," 254.

¹⁶⁶ *Ibid.*, 255.

¹⁶⁷ *Ibid.*, 255.

¹⁶⁸ Uxbridge did receive thirteen requests on D-Day, but all were from FCC units aboard Allied ships. The call received in D +1 was the first that could be traced to an ASP on shore.

Jacobs, "The Battle For France," 257.

of shore. In a move that foreshadowed coming changes, on D + 1 the US V Corps requested and was granted increased air alert squadrons that were to be directed from the FCC aboard a US Navy vessel.¹⁶⁹ All technical and doctrinal inefficiencies aside, however, the lack of close air support sorties on D-Day and the following week can be mostly attributed to the Allied emphasis on interdiction.

As late as D + 5, as landing troops pushed their way past the beaches and into the surrounding countryside, the Ninth Air Force, and indeed the majority of the AEF, remained committed to interdiction and armed recce missions.¹⁷⁰ These missions were meant to delay and destroy German reinforcements, and were met with limited success. The effectiveness of the interdiction campaign before and after D-Day, heralded in many histories as a great success, has also been called into question by some scholars. Despite claims that “battered by continuous aerial attack in the weeks prior to D-Day, [58 German divisions’] immediate deployment to the Normandy area was impossible,” historian Robert Vogel argues that many German units were able to reach the battlefield relatively quickly and intact.¹⁷¹ In the immediate invasion area, Vogel argues that “the armour which was released on the first day — 12th SS and Panzer Lehr — came by road and suffered, by their accounts, relatively few casualties on the march.”¹⁷² Vogel does concede that many units were forced to travel by road due to constant attacks on French rail systems, but argues that even in daytime, marching units were not sufficiently harassed. Vogel cites the 2nd Panzer Division, located near Paris, which was ordered into battle on June 9th. Vogel asserts that “the Division was fully engaged by the 18th.

¹⁶⁹ Jacobs, “The Battle For France,” 258.

¹⁷⁰ *Ibid.*, 258.

¹⁷¹ Sunderman, ed., *World War II in the Air*, 252.

¹⁷² Vogel, “Tactical Power in Normandy,” 42.

Luttwitz, its Commander, complained about delays and inadequate transport but does not report any actual damage or loss.”¹⁷³

This lack of effective interdiction can largely be attributed to both poor weather and the distance between Allied fighter-bomber bases and their targets. Throughout the first six weeks of the campaign, bad weather grounded Allied aircraft on numerous occasions.¹⁷⁴ Neither the Ninth Air Force, nor the Second TAF were trained or equipped for all-weather action, and often were unable to operate effectively due to low clouds or storms.¹⁷⁵ Compounding this, during the early stages of the invasion, Allied forces did not capture as much ground as anticipated, forestalling the construction of sizeable airfields on the continent. As a result, fighter-bombers were forced to fly from bases in England for a week longer than anticipated, and weather conditions in both England and France had to be taken into consideration before a mission could be flown.¹⁷⁶ Such conditions also greatly hampered the effectiveness close air support missions, which were becoming increasingly crucial as German reinforcements bolstered the already formidable defences in Normandy.

By 19 June, Allied forces had captured enough ground that the Ninth Air Force headquarters, along with several of IX TAC squadrons, could be moved to bases on the continent.¹⁷⁷ This new proximity to the battlefield greatly lessened the problems of having to plan for weather, but was still not able to address several other pressing

¹⁷³ Vogel, "Tactical Power in Normandy," 42.

¹⁷⁴ Jacobs, "The Battle For France," 264.

¹⁷⁵ Flying below low clouds was possible on some occasions, but it put airmen at great risk. Below 12,000 ft, aircraft could be hit by German medium AA fire, and below 3,000 ft, could be targeted by even the lightest flak. Airmen also risked collision when taking off, forming up, and landing in cloud cover. *Ibid.*, 264.

¹⁷⁶ *Ibid.*, 264.

¹⁷⁷ *Ibid.*, 258.

concerns. Although the deficiencies of the SR-284 had largely been addressed by the ASPs adoption of the long-range Very High Frequency (VHF) SR-522, communication between the various levels of command remained an issue. The SR-522 radio had been designed for use in aircraft, and the vacuum tubes used in the radios of the day did not fare well in the conditions of ground operations. Radios were prone to cut out unexpectedly due to vibration, overheating and dust.¹⁷⁸

The Ninth Air Force protocols regarding call air support requests also remained quite rigid. FAC officers operating as extensions of ASPs were still requested to clear all requests with rear headquarters, and were only permitted to contact AAF fighter-bombers if changes in the BSL occurred while they were airborne.¹⁷⁹ ASPs were not permitted to call off fighter-bomber strikes, even if Allied aircraft mistakenly attacked friendly troops, an event which occurred no less than nine times during 8-17 June.¹⁸⁰

Friendly fire during ground-attack missions proved to be a problem that the Allies could never fully solve. The use of artillery smoke signals, flares, and coloured panels carried by ground troops were all used to a large extent in aiding pilots' recognition, with the latter being most effective.¹⁸¹ Even panels proved unsuccessful at times, as wary troops had a tendency to flash their panels as aircraft flew overhead, even if they were nowhere near the front. The major issue with this situation is that panels were supposed

¹⁷⁸ Jacobs, "The Battle For France," 265.

¹⁷⁹ *Ibid.*, 261.

¹⁸⁰ *Ibid.*, 265.

¹⁸¹ *Ibid.*, 266.

to signal to AAF airmen that they had reached the front, and anything beyond the panels was enemy territory.¹⁸²

Wary ground units did not cause the only woes of the Ninth Air Force. The natural terrain of Normandy, called the *bocage*, proved quite frustrating for AAF airmen and Allied ground troops alike. The *bocage* consisted of ancient hedgerows built up over centuries along the narrow, sporadic roads that linked the farms, towns, and villages of Normandy. These old hedgerows, sometimes tall enough to obscure entire tank columns, provided excellent cover for German machine guns, tanks, flak emplacements, and the lethal 88mm anti-tank gun. While the *bocage* country made fighting through Normandy a treacherous affair for Allied ground forces, it was almost as equally frustrating from the air. Tall hedgerows offered excellent camouflage for German units evading air strikes, and equally effective cover for AA batteries, which had a nasty tendency to wait for allied aircraft to be well within range before opening fire.¹⁸³ Finally, *bocage* territory made the setting of an accurate BSL all but impossible, as ASPs were often unable to obtain a clear view of the battlefield. Even if a clear view could be achieved, one section of *bocage* territory tended to be indistinguishable from the next from the air, and pilots experienced great difficulty in locating landmarks as described by the ASPs.¹⁸⁴

Problems during Overlord were not limited to the Ninth Air Force. By early July, the slow push inland by Allied ground troops had ground to a halt outside of the towns of St. Lô, Cherbourg and Caen. Stiff German resistance, bolstered by the arrival of several

¹⁸² In late June, a flight of AAF fighter-bombers in support of the US First Army reported seeing panels flashed at them for the entirety of their trip back from the front to the Corps HQ.

Jacobs, "The Battle For France," 266.

¹⁸³ Ninth Air Force losses from June-September 1944 were, on average, 227 aircraft per month. Deadly German AA fire contributed to at least 80% of these losses. *Ibid.*, 280.

¹⁸⁴ *Ibid.*, 265.

armored divisions, had stopped the Allied advance in its tracks. The US First Army faced staunch dug-in German resistance near Cherbourg and St. Lô, while the Canadian and British forces were besieged at Caen by the majority of German armor in the region. After successfully breaking the German lines at Cherbourg in mid-July, US commanders began preparations for a massive offensive, termed Operation Cobra, aimed at the much more formidable defenses around St. Lô.¹⁸⁵ Cobra called for a massive artillery barrage, supported by 550 fighter-bombers, 400 mediums, and 1,500 heavies on a section of the German lines in the span of two and a half hours.¹⁸⁶ It was believed that if this massive bombardment was immediately followed up by an infantry advance, the shell-shocked German defenders would be unable to offer any significant resistance, and a US breakout would be as simple as a “walkover.”¹⁸⁷ Despite US General Ira Eaker’s warning that “heavy and medium bombers should rarely be used on the battlefield” save for “a critical situation in defence... or to precede a large scale amphibious landing against beach defenses,” it was the 1,500 heavies that were expected to be the crucial factor in the success of the bombardment.¹⁸⁸

The bombardment of St. Lô began on 25 July, and by 31 July US ground forces had fought their way through the rubble of the ruined town. The operation, however, was far from unproblematic. USAAF heavy bombers, accustomed to daylight raids on German cities, were unprepared for close air support operations. In several cases, clouds

¹⁸⁵ Richard H. Kohn and Joseph P. Harahan, eds., *Condensed Analysis of the Ninth Air Force in the European Theater of Operations* (Washington, DC: Office of Air Force History, USAF, 1984), 23.

¹⁸⁶ Kohn, and Harahan, eds., *Ninth Air Force*, 26.

¹⁸⁷ Jacobs, “The Battle For France,” 270.

¹⁸⁸ Eaker came to this conclusion after the 1944 fiasco at Monte Cassino in Italy, where heavy bombers were called upon to break the German Gustav line. Nearly 500 heavies pulverized the garrison in the town of Monte Cassino. The bombing only served to provide the defending Germans with more defensible positions, and they halted the US Fifth Army’s subsequent advance with little difficulty. Wilt, “Allied Cooperation in Italy and Sicily,” 213.

obscured the battlefield, causing the lead bomber to release its bombs short of the target, which in turn, prompted the entire formation to do the same.¹⁸⁹ Incidences of friendly fire due to short bombing were high, with over 700 friendly casualties suffered during the entire offensive.¹⁹⁰ Despite these losses, and initial German resistance, US ground forces eventually broke the German lines, and entered into a phase of mobile war that was not to conclude until the defeat of the enemy in France.

While historians generally remain critical of the use of heavy bombers due to the high incidence of inaccurate and friendly fire, there is no doubt that the destruction they caused was a factor in the German defeat. Though the offensive following the bombing was far from a "walkover," Operation Cobra did prove successful, and the role played by the heavies in that success, however small, cannot be neglected.¹⁹¹ Heavy bombers however, proved too costly a weapon to be employed regularly at the battlefront, due to the loss of both Allied lives and potential raids on Germany. Five times in the Normandy campaign, heavy bombers were used in support of front-line troops, with Cobra being the most famous and effective.¹⁹² In all cases, the use of heavies did not prove to be the decisive factor. The high risk to friendly troops, coupled with the general inefficiency of 'precision' bombing only served to underscore Eaker's point that the heavy bomber was not to be used for close air support.

The US breakout at St. Lô was a turning point in the battle for France, advancing the fighting beyond the *bocage*, and into the open terrain of Brittany. Shortly after the success of Cobra, British and Canadian troops also broke out at Caen, beginning a phase

¹⁸⁹ Jacobs, "The Battle For France," 270.

¹⁹⁰ Bill Yenne, *Operation Cobra and the Great Offensive* (New York: Pocket Books, 2004), 64.

¹⁹¹ Jacobs, "The Battle For France," 270.

¹⁹² Heavies of the RAF Bomber Command were used by the British twice shortly before Cobra, and twice shortly after. *Ibid.*, 270.

of mobile warfare that saw the Germans pushed out of France by the late fall of 1944. The literal Allied breakout on the ground was accompanied by a figurative one in the doctrine and techniques of the Ninth Air Force. As in the Mediterranean, the Ninth Air Force's fighter-bombers had begun practicing ROVER JOE, armed recce, and CABRANK, which had been met with limited success in the semi-static, limited fighting in the *bocage*. Prior to the breakout, the Ninth Air Force HQ also remained fiercely opposed to the decentralization of air strike targets, limiting the power of ASPs and FACs. As Allied forces pushed the Germans back in a war of ever-increasing mobility, AAF leaders were forced to adapt to the rapidly changing conditions.

The most significant change made by the AAF in France was a modification of CABRANK called Armored Column Cover (ACC), pioneered by US General Quesada.¹⁹³ Like CABRANK, ACC involved a constant flight of AAF fighter-bombers over the front line. Where ACC differed, however, was that ASP officers were now placed in the leading tank in each column, allowing the ASP to be as mobile as the front line forces. Furthermore, Quesada decentralized target selection and equipped lead tanks with VHF radios, allowing the ASPs to directly communicate with the flights of fighter-bombers, and direct them towards targets of opportunity.¹⁹⁴ Implemented in early August, Quesada's methods quickly became standard procedure for the entire Ninth Air Force, and ACC was "consistently rated by ground commanders as the most effective form of close air support."¹⁹⁵ ACC, and an equivalent system created by the British, continued to be used by the Allies for the remainder of the mobile operations of the Second World War.

¹⁹³ Jacobs, "The Battle For France," 271.

¹⁹⁴ *Ibid.*, 271.

¹⁹⁵ *Ibid.*, 272.

On 15 August, shortly after the victory at St. Lô, Allied forces landed in Southern France, and with them came the aircraft and techniques of the IIX TAC, which had been fighting its way up the Italian peninsula since September of 1943.¹⁹⁶ Because the tactical air doctrine developed in the Mediterranean was largely on an *ad hoc* basis, it was largely unknown to the Ninth Air Force. The invasion of Southern France, code named Operation Dragoon, introduced the Horsefly and Pineapple systems of close air support to the northern Allied air forces, which were in turn incorporated into their techniques. The combination of Mediterranean and European experience only served to increase the versatility of the Ninth's close air support capabilities. In addition to improved techniques, as early as July, US fighter-bombers had begun to carry five-inch High Velocity Aircraft Rockets (HVAR), and napalm firebombs for use against German armor and fortified positions.¹⁹⁷ Equipped with these new techniques and technology, the tactical forces of the USAAF were well on their way to becoming the devastating force that greatly accelerated the Allied drive towards Germany.

¹⁹⁶ Jacobs, "The Battle For France," 272.

¹⁹⁷ Gooderson, *Air Power at the Battlefield*, 108.

"Blitz Warfare, US-style:"¹⁹⁸ Victory in France, August-December 1944

Following the breakouts at St. Lô and Caen, Allied forces were almost continuously on the offensive for the remainder of 1944. By December, Allied forces had almost completely ousted the Germans from France, pushing them back into Belgium and Germany itself. During this period of nearly unlimited offensive, Allied tactical air power earned itself a reputation amongst friend and foe alike as a lethal fighting force, capable of wreaking havoc upon the enemy. Now equipped with the advanced technology and techniques that would endure for the remainder of the war, the Ninth Air Force greatly aided US ground forces in both capturing new territory, and halting fierce German counterattacks.

An example of the Ninth Air Force's improved effectiveness was displayed during the German counterattack on 7 August at Avranches and Mortain. Attempting to reduce the gains made by the US First Army after Operation Cobra, the Germans threw over three divisions, including the 2nd Panzer Division, at the relatively unprepared defenders of the US 30th and 9th Infantry Divisions.¹⁹⁹ Armed with insufficient anti-tank weaponry, US forces called in units from the IX TAC and RAF No. 83 Group to attack the German armored columns and soft-skinned supply vehicles. By the end of 7 August, the German attack had been halted, and several German vehicles destroyed.²⁰⁰ Heinrich von Lüttwitz, commander of the 2nd Panzer Division, said of the Allied fighter-bombers: "They came in hundreds, firing their rockets at the concentrated tanks and vehicles. We

¹⁹⁸ David N. Spire, *Air Power in Patton's Army: The XIX Tactical Air Command in the Second World War* (Washington, DC: Library of Congress, 2002), 70.

¹⁹⁹ Gooderson, *Air Power at the Battlefield*, 110.

²⁰⁰ The Ninth Air force claimed 112 German armored units, and 116 motor transports destroyed. These claims, however were proven to be exaggerated. *Ibid.*, 113.

could do nothing against them and we could make no further progress.”²⁰¹ Von Lüttwitz’s testimony is echoed by many of the German officers who participated in the attack, most of whom attribute its failure to the overwhelming attacks of the IX TAC and RAF No. 83 Group.²⁰²

By 12 August, Allied armies had begun an attempt to surround the German Seventh and Fifth Panzer Armies in what was to become the Falaise Pocket. The Allied plan called for British and Canadian troops under Montgomery to push from the north, meeting up with the US First Army in the south, effectively capturing or destroying the bulk of German forces west of the Seine River.²⁰³ Though Allied forces took far longer than expected to close the gap, allowing tens of thousands of Germans to escape encirclement, Falaise was nevertheless a crushing victory for the Allies. During the period of 12-21 August, AAF airmen flew nearly 2,900 sorties, claiming over 2,500 soft and 130 armored vehicles, numbers greatly exceeded by their British counterparts.²⁰⁴ Subsequent ORs carried out by the British Operational Research Section (ORS) No. 2 confirmed that nearly 50% of all German soft-skinned vehicles destroyed within an area of the pocket had been attacked by Allied aircraft.²⁰⁵ The report went on to conclude that of 133 destroyed tanks and self-propelled guns within the study area, 33 – only one quarter – had been destroyed by aircraft.²⁰⁶ This report, while confirming that Allied aircraft were effective against soft-skinned vehicles, called into question their effectiveness when faced with tougher targets.

²⁰¹ Gooderson, *Air Power at the Battlefield*, 112.

²⁰² Jacobs, “The Battle For France,” 274.

²⁰³ Gooderson, *Air Power at the Battlefield*, 117.

²⁰⁴ During the same period, the RAF flew 9,900 sorties, claiming over 3,000 soft and 250 armored vehicles. *Ibid.*, 117.

²⁰⁵ *Ibid.*, 117.

²⁰⁶ *Ibid.*, 117.

The effectiveness of the Ninth Air Force, and indeed the Allied tactical air forces in general during this period of rapid offensive has been recently debated amongst historians. Due to their seemingly infinite ability to destroy enemy armor, many Allied aircraft, particularly the RAF Hawker Typhoon and the US P-47, became known as “tankbusters” during the war, and in many popular histories following it. Armed with rockets and high-explosive bombs, the tankbusters presented a formidable foe, and it was widely believed that a single squadron could decimate entire German tank columns. Though this perception is not entirely inaccurate, the title of “tankbuster” has been proven to be somewhat of a misnomer, as destroying tanks proved to be one of the most difficult actions for AAF and RAF pilots. The standard armament of .50 calibre machine guns of AAF aircraft, and 20mm cannons and .303 calibre machine guns of RAF aircraft, lethal against soft-skinned vehicles and rail cars, proved ineffective against German armor. Only by aiming at the vulnerable exhaust ports at the rear of the tank, or ricocheting bullets off the ground into its soft underbelly could Allied airmen hope to cause any significant damage to their target.²⁰⁷ Such techniques required incredible accuracy from pilots flying in excess of 350mph, who would have no more than three or four seconds with which to target and attack individual tanks.

Bombs and rockets, particularly the latter, tended to fare better against heavy German armor, but were no easier to aim. In a test conducted by the RAF in Normandy in 1944, a captured German Panther tank was painted white and set up to be attacked by two waves of four Hawker Typhoons. Of the 64 rockets fired in the two attacks, three made contact, each inflicting enough damage to put the tank out of commission in a battlefield

²⁰⁷ Spire, *Air Power in Patton's Army*, 89.

setting.²⁰⁸ This success rate of 4.7% of rockets finding their mark diminished even further when enemy tanks were camouflaged, covered, mobile, and protected by German flak. Allied bombs proved even less accurate, and both rockets and bombs required a direct hit – a near impossible feat – in order to destroy an armored target.²⁰⁹

Another factor that greatly added to the myth of the Allied air forces' unstoppable onslaught was overclaim by Allied pilots. Throughout the campaign, ORS reports revealed that on a number of occasions, the number of wrecked enemy vehicles was considerably fewer than had been claimed by AAF and RAF airmen. Even allowing for the recovery and salvage of damaged vehicles by retreating German forces, the reports concluded that the claims made by the Ninth Air Force and the 2nd TAF had been exaggerated. One factor that can describe the overclaim of tanks destroyed is the issue of recognition. According to historian Ian Gooderson, "what constituted a tank was often loosely defined by pilots, a former American fighter-bomber pilot admitting that assault guns, armoured [sic] artillery, and tank destroyers were all identified by pilots as 'tanks.'"²¹⁰ Flying by at 350mph made differentiating between each of these vehicles an impossible task for Allied pilots, and the result was the constant claiming that several more German tanks had been destroyed than in reality. This overclaim of 'tanks' may also explain how Allied aircraft became to be known as tankbusters.

Another factor that contributed heavily to Allied overclaim was duplication. From the air, a pilot could only be certain he had destroyed an enemy vehicle if it either began to smoke or burst into flame. If a German vehicle had been disabled, but not destroyed from an air attack, it was likely to be subject to other attacks, increasing the number of

²⁰⁸ Gooderson, *Air Power at the Battlefield*, 104.

²⁰⁹ *Ibid.*, 107.

²¹⁰ *Ibid.*, 122.

pilots who claimed to have destroyed it. For example, No. 2 ORS conducted a survey of the Falaise area after it had been captured by the Allies. During the survey, ORS came upon disabled German troop carrier that civilians claimed had come under strafing attack twelve separate times.²¹¹ It is likely that this vehicle factored into twelve separate claims. Though overclaim and accuracy proved to be two enduring problems during the battle for France, they hardly diminished the overall effectiveness of the Allied tactical air effort.

Despite their reduced effectiveness against tanks, the Allied tactical air forces proved invaluable to the advance through France in other crucial roles. What the Ninth Air Force lacked in its ability to destroy German armor, it made up for in its ability to neutralize or destroy other German units. Front-line experiences and interviews with German prisoners quickly made apparent the formidable effect, both physical and psychological, of Allied fighter-bombers on the German war effort. In terms of physical damage, armed recon aircraft of the Ninth Air Force wreaked havoc on German supply lines, communication centers, and troop concentrations. On 11 August, Allied command intercepted a German message from XLVII Panzer Corps headquarters divulging that German armored units in Northern France were desperately short of fuel. The following day a similar message reported that 30 tanks of the Panzer Lehr were unable to participate in battle due to fuel shortages.²¹² These shortages at the front can be attributed to the extensive damage to German supply lines by Allied armed recon patrols that had become a mainstay in the AAF and RAF by this time.

To avoid detection and heavy losses, German troops and supply convoys were forced to move by night, resulting in piecemeal reinforcement and resupply. In a

²¹¹ Gooderson, *Air Power at the Battlefield*, 122.

²¹² *Ibid.*, 216.

document prepared in June, German Field Marshal Gerd von Rundstedt claimed that German troop movements as far 150km behind the front line could be subject to Allied interdiction, and that any daylight movement within 20km of the front was certain to be attacked.²¹³ As early as June it became clear to Rommel, architect of the defences in Normandy, that Allied air power was severely hindering German defensive operations. In a message to Hitler on 12 June, Rommel warned that German "operations are rendered extraordinarily difficult and in part impossible to carry out [owing to] the exceptionally strong and, in some respects overwhelming, superiority of the enemy air force."²¹⁴

AAF airmen also became more adept at attacking dug-in and fortified defences. In Normandy, it quickly became apparent that the use of napalm against German trenches, gun emplacements, pillboxes, and even tanks was often preferable to conventional high explosive or fragmentation bombs. While German troops remained fairly immune to bombing attacks while inside their tanks, pillboxes, or slit-trenches, napalm often proved able to clear out entire German strongholds, as the heat from the flames made continued defence unbearable.²¹⁵ By 1945 an ORS study had been conducted regarding the effects of napalm on enemy troops, which is worth quoting at length:

Heavy artillery and/or GP [general purpose] bombing destroys or damages buildings, communication facilities, prepared defences; consequently, the enemy must utilize masses of rubble and smashed houses as... defence positions. Napalm... upon the devastated area renders these temporary emplacements untenable, causes fires to take hold in the wreckage, and drives the enemy out into the open... The enemy troops who are not evacuated have, in a majority of cases, taken refuge in cellars, and are subject to assault without being able to offer effective resistance.²¹⁶

²¹³ Jacobs, "The Battle For France," 283.

²¹⁴ Paul Johnston, "Tactical Air Power Controversies in Normandy: A Question of Doctrine," *Canadian Military History* 9, no. 2 (2000): 59.

²¹⁵ Gooderson, *Air Power at the Battlefront*, 179-80.

²¹⁶ *Ibid.*, 180.

Such devastating physical effects of napalm and other weaponry of the AAF quickly became feared by the German defenders in France. This fear became, in and of itself, an effective weapon against the Germans. The psychological effect that Allied tactical air power had on the Germans is arguably just as significant as its physical effects.

During the battle for France, a US XIX Corps report stated that their light armor units had been repeatedly repulsed in their attempts to clear a hilly section of woods defended by Germans armed with anti-tank and machine guns. To soften the defences before the next assault, a fighter-bomber squadron of the Ninth Air Force was called in to bomb and strafe the woods. Following the strafing attacks, the German unit quickly surrendered before the next ground assault could be launched. When interrogated after their surrender, German "POWs said the bombing was not so bad, but when the 'Jabos'²¹⁷ strafed them they lost all will to fight and tended to make the men scatter for protection regardless of orders. Many were found hiding below the ground and they didn't offer much resistance."²¹⁸

In another instance, the US 8th Infantry Division encountered stubborn resistance in an assault on the Crozon Peninsula in September of 1944. Unwilling to sacrifice his men for a non-vital objective, the commander of the 8th called in fighter-bombers from IX TAC. Upon seeing the incoming aircraft, the German units immediately surrendered, precluding any attack runs made by the AAF.²¹⁹

²¹⁷ German military slang for fighter-bomber aircraft, derived from the German name "jäger-bomber," or "hunter-bomber."

²¹⁸ Quoted from the AAF Evaluation Board in the European Theatre of Operations (ETO).

Gooderson, *Air Power at the Battlefront*, 179.

²¹⁹ *Ibid.*, 182

In a striking example of the psychological effect of Allied airpower, on 1 November 1944 the 8th Canadian Reconnaissance Regiment was faced with a determined German force occupying the island of North Beveland in the Netherlands. Instead of risking a frontal assault, the Canadian commander simply informed the Germans that Typhoons from the RAF No. 84 Group would make several passes over their positions. When making the first pass, the Typhoons would not fire on the German positions, but afterwards, they would attack at will. No sooner had the 18 Typhoons made their first pass, than the entire German garrison surrendered, presenting the 8th Reconnaissance with 450 prisoners without a shot being fired.²²⁰

Even German tank crews, despite their relative safety from Allied aircraft, came to believe in the 'tankbuster' myth. Senior German tank crews, aware that they were far more likely to be killed outside of their tanks than inside, remained unable to convince less experienced crews that this was the case. On numerous occasions, inexperienced German tank crews would abandon their vehicles at the first sign of Allied aircraft. One of the most famous examples of this phenomenon occurred at Mortain on 7 August. According to an ORS report, ten of the 33 Panthers found after the battle had been simply abandoned, undamaged and with adequate fuel, by their crews.²²¹

Perhaps the most prominent example of the effectiveness of the Ninth Air Force achieved during the summer of 1944 was its cooperation with US General Patton and his

²²⁰ Although this instance highlights RAF action outside of France, it nonetheless illustrates the powerful psychological effect of Allied fighter-bombers on German ground units in 1944.

Gooderson, *Air Power at the Battlefield*, 182.

²²¹ *Ibid.*, 116.

Third Army. Shortly after the successful defence of Avranches, the newly formed Third Army began its swift campaign to the east that was hindered only by the Allied lack of supplies, particularly fuel. To support the Third Army's advance, General Quesada created XIX TAC under US General Weyland, which was to provide the ground forces with the 'flying artillery' their mobile units otherwise lacked.²²² Patton, relying heavily on frontal assaults made by seemingly endless armor columns with infantry in support, punched through the German defences at astonishing speed. During 7-31 August, Patton's Third Army bypassed Paris and pushed the Germans from Avranches to just outside of Metz, a distance of over 350 miles.²²³ XIX TAC proved crucial to both the capture and holding of enemy territory. Patton's enthusiasm for armored assaults was matched by his acceptance of ACC and armed recce patrols, which greatly increased the striking power of his attacking spearheads. The combination of air power and armor quickly tore through hastily organized German defences, slowed only by fuel shortages that were to plague the advances of the Third Army from August 1944 until Spring 1945.

Throughout this campaign of movement, XIX TAC was involved in operations over a 350-mile front. Despite potential logistical nightmares, the men of XIX TAC rose to the occasion, never once leaving the Third Army without sufficient air support. In order to streamline his command over XIX TAC, Weyland further decentralized command over air units, allowing the authorization of air support missions by subordinate air commanders.²²⁴ Weyland also frequently flew L-5s and P-47s from one end of the front

²²² Medium artillery had become standard issue for US infantry and armor divisions in lieu of heavy artillery in 1940. This decision was made to increase the mobility of US ground forces, with the understanding that AAF aircraft could largely compensate for the lack of firepower. Spire, *Air Power in Patton's Army*, 111.

²²³ Jacobs, "The Battle For France," 275.

²²⁴ Spire, *Air Power in Patton's Army*, 118.

to the other in order to better coordinate XIX TAC's role in each of the areas in which it was engaged.²²⁵

As Patton relentlessly pushed further and further into France, his forces created a massive salient into German-held territory, leaving his southern flank vulnerable to counterattack. As much of the Allied effort at this time was directed towards the liberation of Paris and subsequent campaigns in Holland and Belgium, very few units could be allocated for the defence of Patton's exposed flank. To remedy this, Patton and Weyland devised a strategy that saw XIX TAC almost exclusively receive the responsibility to defend the Third Army's southern flank.²²⁶ Throughout August and early September, XIX TAC flew relentless armed recce and interdiction missions against the German forces to the south, many of which targeted the retreating forces that had been routed by Operation Dragoon in Southern France. On the night of 1 September alone, XIX TAC claimed over 800 motor vehicles destroyed or damaged.²²⁷

By 9 September, it had become clear to US commanders that the remaining German forces to the south of the salient were teetering on the edge of surrender. When asked, Patton declined to lead an assault into the territory, as the Third Army was suffering from fuel shortages, bogging it down just outside to Metz. The job fell to US Lieutenant General Simpson and Major General Macon of the 83rd Infantry Division, who devised a plan aimed at reducing casualties during the operation.²²⁸ By this plan, all available XIX TAC squadrons were to fly over German troop positions in a show of force, while Simpson presented terms of surrender to the German commander, Major General Elster.

²²⁵ Spire, *Air Power in Patton's Army*, 120.

²²⁶ Elements of the US VIII Corps were thinly spread along the flank as well, but Patton relied primarily on XIX TAC for its defence. Spire, *Air Power in Patton's Army*, 103-4

²²⁷ *Ibid.*, 104.

²²⁸ *Ibid.*, 106.

If Elster rejected the terms, the fighter-bombers would return and attack the German positions. Elster, and the 20,000 Germans he commanded, surrendered without firing a shot. Both he and Simpson requested that General Weyland be present at the formal surrender on 16 September, marking the first time that a ground commander was to surrender in the presence of an air commander.²²⁹

The efforts of Weyland and XIX TAC marked a new high point in the tactical employment of Allied air power. For the first time in US military history, an air unit had been primarily responsible for, and indeed successful in, guarding the flank of a ground force. Although this employment of air power as a substitute for ground power was not to be used in an operation this large for the remainder of the war, the precedent had been set. The Ninth Air Force had proved itself a critical factor in the battle for France.

By the early winter of 1944 the majority of France, as well as areas of Belgium and Holland, lay in Allied hands. Only a few German strongholds remained between Allied forces in France and the German border. With the Soviets hastily pushing towards Berlin in the east, and the Allies moving from the west, the end of the Third Reich was not a matter of if, but a matter of when.

So feared and respected were the Allied air forces after the French campaign that Hitler's last major counterattack of the war, the Ardennes Offensive of December 1944 to January 1945, was planned to coincide with foul weather. Grounded by low cloud for over a week, Allied airmen were forced to remain spectators as US ground forces suffered their first major losses of ground since the invasion. By mid-January, however, the skies had cleared and the Germans had run out of fuel. The "Battle of the Bulge," as it became known, ended in Allied victory, thanks in large part to the clearing of the skies.

²²⁹ Spire, *Air Power in Patton's Army*, 107.

Allied tactical air power had been a crucial element in the swiftness of the Allied capture of France. Like operations in the Mediterranean, the initial battles in France saw weaknesses within the Ninth Air Force, which once exposed, were remedied on an *ad hoc* basis. Unlike the Mediterranean, however, tactical air power evolved to become absolutely devastating in its employment, and on occasion, a decisive factor in Allied victories. Allied tactical air power had become so effective in fact, that no major doctrinal or technical changes were made to the Ninth Air Force for the remainder of the war.

Conculsion

The story of the USAAF's employment of tactical air power in the Second World War is one of constant *ad hoc* improvement. Despite President Roosevelt's best efforts in the early 1940s to prepare his country for war, the USAAF entered combat in North Africa in late 1942 unprepared to face the experienced Axis forces that awaited it. Relying on untested doctrine that put the command of the AAF squarely in the hand of ground commanders who were unable to effectively use it, USAAF tactical air effort prior to the Casablanca Conference abysmal. Following the reorganization of the Allied air forces at Casablanca in early 1943, Allied air commanders were granted control of their air forces, and the AAF began to show signs of improving its tactical doctrine and techniques. Fighter-bombers were recognized as the premier weapon of tactical support and interdiction, and cooperation between units of the RAF and the USAAF became standard practice. By the expulsion of Axis forces from North Africa in the spring of 1943, the foundations for the lethal fighting force that was to conquer France the following year had begun to take shape.

The Allied campaigns in Sicily and Italy from 1943-45 only built upon these foundations, highlighting additional weaknesses in AAF tactical air power, and allowing for further refinement and reinvention. The Italian campaign gave rise to such effective tactical support systems as ROVER JOE, armed reconnaissance, CABRANK, and Horsefly. Air and ground commanders began to understand that joint efforts were crucial in maximizing effectiveness. The Italian campaigns also saw the entrance of the USAAF's premier fighter-bomber aircraft, the P-47 Thunderbolt, which was to perform the majority of tactical support for the remainder of the war. By the end of the Italian

campaign, the Allied air forces of the Mediterranean had developed effective and deadly tactical air support techniques that were to greatly influence the battle for France.

Ultimately, it was in France that the tactical power USAAF reached its zenith. Following the Allied breakouts at Caen and St. Lô in early August of 1944, Allied air power became the unstoppable force that facilitated the swift liberation of France, and pushes into Belgium and Holland. The USAAF General Quesada's innovative Armored Column Cover became the most effective air support technique of the Second World War. It was in France that air units became of striking fear into the hearts of their enemies, occasionally causing German forces to surrender without firing a shot. Despite a reduced effectiveness against German heavy armor, aircraft of the AAF wreaked havoc on German supply lines, communication centers, and troop formations. The near-mythical status achieved by the USAAF during the closing 18 months of the war stands as a testament to its overall effectiveness on the battlefield.

That it took the US military nearly three years of continuous warfare in two European theatres to achieve an effective system of tactical air power highlights the complexity and unpredictable nature of the modern battlefield. Due to its policy of neutrality the 1930s and early 1940s, the US military did not have a significant presence in Europe until late 1942, nearly three years after the fighting had begun. As a result, they found that even when equipped with technology as advanced as that of their adversaries, their military doctrine required drastic improvement that could only be accomplished through battlefield experience.

Tactical air power, a relatively new and untested method of battle, added a third dimension to the already intricate battlefield tactics of the US military, one to which the

US was not initially prepared to adapt. The forging of the eventual cooperation between the ground and air forces of the US was by no means swift or efficient. Due to their *ad hoc* nature, doctrinal improvements within the USAAF were often not written down and incorporated into the official USAAF field manuals. As a result, particularly in Normandy, USAAF units were often forced to overcome obstacles that had been addressed many months before by their Mediterranean counterparts.

Despite these setbacks, the USAAF did evolve, both technologically and doctrinally relatively quickly during the Second World War. By war's end, the USAAF possessed the most advanced and lethal piston engine fighter and fighter-bomber aircraft in the world, and a true understanding of the devastating potential of close coordination between ground and air forces.

Bibliography

- Bechthold, Michael. "A Question of Success: Tactical Air Doctrine and Practice in North Africa, 1942-3." *The Journal of Military History* 68, no. 3 (2004): 821-851.
- Bechtold, Michael. "Tactical Air Power: Its Effectiveness During the Normandy Campaign." *The Journal of the Canadian Aviation Historical Society* 31, no. 2 (1993): 54-66.
- Biddle, Tami Davis. *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1941-45*. New Jersey: Princeton University Press, 2002.
- Boyne, Walter J. *The Influence of Air Power Upon History*. Yorkshire England: Pen & Sword Aviation, 2005.
- Buckley, John. *Air Power in the Age of Total War*. Bloomington: Indiana University Press, 1999.
- Coles, Harry L. "Participation of the Ninth and Twelfth Air Forces in the Sicilian Campaign." In *USAF Hist Study #37*, 1-246. Washington, DC: Library of Congress, 1945.
- Craven, Wesley Frank and James Lea Cate, ed. *The Army Air Forces in World War II vol. IV*. Chicago: University of Chicago Press, 1948-58.
- Gooderson, Ian. *Air Power at the Battlefield: Allied Close Air Support in Europe 1943-45*. Portland: Frank Cass, 1998.
- Jacobs, W. A. "The Battle For France." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 237-293. Washington, DC: Library of Congress, 1990.
- Johnston, Paul. "Tactical Air Power Controversies in Normandy: A Question of Doctrine." *Canadian Military History* 9, no. 2 (2000): 59-71.
- Johnston, Paul. "The Question of British Influence on U.S. Tactical Air Power in World War II." *Air Power History* 52, no. 1 (2005): 16-33.
- Kohn, Richard H. and Joseph P. Harahan, eds., *Condensed Analysis of the Ninth Air Force in the European Theater of Operations* Washington, DC: Office of Air Force History, USAF, 1984.

- Mayock, Thomas J. "Notes on the Development of AAF Tactical Air Doctrine." *Military Affairs* 14, no. 4 (Winter, 1950): 181-186.
- Mortensen, Daniel R. *A Pattern for Joint Operations: World War II Close Air Support, North Africa*. Washington, DC: Library of Congress, 1987.
- Nalty, Bernard C. ed. *Winged Shield, Winged Sword: A History of the United States Air Force, Vol. 1*. Washington, DC: Library of Congress, 1997.
- Osborne, Eric W. *Britain's Naval Blockade of Germany, 1914-1919*. New York: Frank Cass, 2004.
- Spire, David N. *Air Power in Patton's Army: The XIX Tactical Air Command in the Second World War*. Washington, DC: Library of Congress, 2002.
- Sunderman, Major James F., ed. *World War II In the Air: Europe*. New York: Bramhall House, 1953.
- Syrett, David. "The Tunisian Campaign." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 153-192. Washington, DC: Library of Congress, 1990.
- Thompson, Roger. *Lessons Not Learned: The US Navy's Status Quo Culture*. Annapolis: Naval Institute Press, 2007.
- Vogel, Robert. "Tactical Air Power in Normandy: Some Thoughts on the Interdiction Plan." *Canadian Military History* 3, no. 1 (1994): 37-47.
- Walker, Henry. *The Private Life of Henry VIII*. New York: I.B. Tauris & Co. Ltd., 2003.
- Wilt, Alan F. "Allied Cooperation in Italy and Sicily." In *Case Studies in the Development of Close Air Support*, edited by Benjamin Franklin Cooling, 193-236. Washington, DC: Library of Congress, 1990.
- Wise, Sidney F. *Canadian Airmen and the First World War: The Official History of the Royal Canadian Air Force, Vol. 1*. Toronto: University of Toronto Press, 1980.
- Yenne, Bill. *Operation Cobra and the Great Offensive*. New York: Pocket Books, 2004.