

Joint by Design:
The Western Desert Campaign

A Monograph

by

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Abstract

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During the Second World War, the Allied Forces were victorious in the Western Desert Campaign not because of heroic individual leadership, but because improvements in command relationships, basing, and resource allocation enabled them to fight effectively as a joint and coalition force. Air and land commanders used co-located headquarters and liaison officers to overcome significant philosophical differences in the structure of the British versus American chains of command. Air forces developed a technique to move operations to a new aerodrome quickly, enhancing flexibility and reach. Finally, the Allied forces applied a systems approach to shock and overwhelm the enemy, attacking it with a combination of American bomber aircraft and improved close air support tactics.

Today's military should emulate the way the Allies allocated their resources in North Africa. Rather than focusing exclusively on a single perceived decisive node or parceling air support to ground commanders at the lowest echelons, planners should attack the enemy as a system. In an era of reduced military spending, the United States cannot count on an ability to mass resources and "win" with brute force alone. Like the Allied forces in North Africa, America may again find itself under-resourced in a fight against a near-peer competitor. Success will lie in effectively using every available tool to understand the situation and then act in multiple ways to shock the enemy's system—out thinking the adversary when out-numbering or out-spending is impossible.

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Introduction

Seated in a dusty tent, finally cooling in the Egyptian night, the “Desert Fox” had a serious problem. German Lieutenant General Erwin Rommel must have longed for the days when he tore through Belgium and France with the Seventh Panzer Division in 1940. How different things were in the hot summer desert far to the south. For two years, the British and Axis forces had fought to a stalemate in North Africa.¹ Throughout the summer of 1942, however, the Allies had tightened the noose, gradually choking Rommel’s fragile supply lines. As his fuel supplies reached critically low levels, he knew he would be unable to hold his tenuous position indefinitely. Under a full moon that glinted off the desert sand on the night of August 30, 1942, Rommel launched a desperate offensive against Field Marshal Bernard Montgomery’s Eighth Army at El Alamein. He planned to threaten the Eighth Army’s exposed southern flank with a wide right hook to the east, then a turn north beyond the Alam El Halfa Ridge. Relying on speed and surprise, Rommel’s forces would flank the British and finally break through to the Suez Canal. Instead, the German commander found himself bogged down in treacherous minefields and loose sand under heavy fire from coalition aircraft and artillery. The slow movement further depleted his precious fuel supply, and forced him to shorten his path by hooking north before the ridge. Unlike his previously successful operations, this time the Desert Fox was unable to draw the Allied tanks into the open. Taking heavy losses, he anxiously awaited his promised fuel resupply. It never came. On the morning of September 3, Rommel began his retreat. The desert seesaw was over, and eventually the remains of the Panzer Army would lay shattered on the

¹ In this paper, “British” refers to the coalition of British Commonwealth and British Empire nations that contributed to the Eighth Army and Royal Air Force, including Australia, New Zealand, India, Canada, South Africa, and the United Kingdom.

shifting sands.² One Allied commander wrote, “Not only was Rommel’s bid for Egypt ended, but he was totally and finally defeated. He would never again take the offensive.”³

In the early stages of the Second World War, North Africa was strategically important. Following early German successes in Europe, Benito Mussolini declared war on France and Britain in June 1940. In a clash of empires, Mussolini’s goal was to force the British out of Egypt, claim the Suez Canal, and thus control access to crucial oil supplies in the Middle East. Simultaneously the Italians attacked British Imperial forces in Sudan, Kenya, and British Somaliland, but to no avail. The British forced Italy out of Ethiopia, Italian Somaliland, British Somaliland, and Eritrea, and the Italian army in East Africa surrendered on May 19, 1941. Meanwhile, Italian forces in Libya invaded Egypt in September 1940. In December, British forces counterattacked and soundly defeated the Italians in February 1941. Unwilling to let Mussolini’s military defeat become a political victory for the Allies, Adolf Hitler dispatched two Panzer divisions to Libya, known as the Afrika Korps, putting Rommel in command.⁴ Rommel launched a counter-attack in March that surprised the British and forced them to withdraw to the east along the North African coast. For the next fourteen months, battles “were to ebb and flow eastwards and westwards across the Western Desert.”⁵ After a significant Axis victory in June, the British forces retreated east to a defensive line at the small coastal town of El Alamein, the last defensible point before Alexandria and the Suez Canal. The Eighth Army fortified its

² Stephen Bungay, *Alamein* (London: Aurum Press, 2002), 133-39; Harry Cole, “Army Air Forces Historical Studies No. 30: Ninth Air Force in the Western Desert Campaign to 23 January, 1943” (1945), 32-38.

³ Lewis H. Brereton, *The Brereton Diaries: The War in the Air in the Pacific, Middle East and Europe 3 October 1941 – 8 May 1945* (New York: William Morrow and Company, 1946), 152.

⁴ Bungay, *Alamein*, 3-8; Douglas Porch, *The Path to Victory: The Mediterranean Theater in World War II* (New York: Farrar, Straus and Giroux, 2004), 108-28; Richard J. Overy, *The Air War: 1939-1945* (Washington, DC: Potomac Books, 2005), 42.

⁵ Bryn Hammond, *El Alamein: The Battle that Turned the Tide of the Second World War* (Oxford: Osprey Publishing, 2012), 14-17.

position with minefields and wire along the forty-mile stretch of desert between the Mediterranean Sea to the north and the impassable Qattara Depression to the south. British General Claude Auchinleck, commander of ground forces in the Western Desert, took over the duties of field commander during the retreat.⁶ The strategic implications of the stalemate in the Western Desert had far-reaching effects in terms of morale, resolve, and world opinion. The public saw that despite “numerically stronger forces,” the British “had failed to defeat the Axis.” In fact, “British prestige in the Middle East sank to a new depth when it began to look as if, despite American lend-lease equipment which was being sent in an ever-increasing stream, the Suez Canal would be lost to the Allied cause.”⁷

The common understanding of British success in the subsequent Battle of El Alamein centers on one legendary figure. In August 1942, British Prime Minister Winston Churchill sent Montgomery to take command of the Eighth Army at El Alamein. Montgomery told his troops, “Here we will stand and fight; there will be no further withdrawal...If we can’t stay here alive, then let us stay here dead.”⁸ Two weeks later, his reinvigorated forces turned back Rommel’s final attack in the Battle of Alam Halfa. He then focused on training and rehearsing before the counterattack on October 23. On November 2, despite heavy losses on both sides, British armor broke through Rommel’s defenses. As enemy forces retreated to the west, the Allies gained control of several key decisive points: first Matruh, then Halfaya Pass, Tobruk, and Benghazi (see Figure 1). As the Germans withdrew, they laid mines and dynamited bridges to slow the British. With his forces depleted and no hope for reinforcements, Rommel continued to Tripoli, an ancient city situated on the edge of the desert, overlooking the Mediterranean Sea. After the

⁶ Hammond, *El Alamein*, 39-40; Arthur W. Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force Lord Tedder* (London: Cassell and Company LTD, 1966), 304.

⁷ Cole, “Ninth Air Force,” 3.

⁸ Nigel Hamilton, *Montgomery: D-Day Commander* (Washington, DC: Potomac Books, 2007), 22.

American and British landings in Operation Torch threatened his rear, Rommel turned to Tunisia, and Tripoli fell to the Eighth Army on January 23, 1943. Fighting in Tunisia continued throughout the spring. After the Allies struggled at Kasserine Pass, Rommel returned to Germany on March 9. By early May, the Axis forces had all surrendered, forfeiting Africa to the Allies.⁹ Churchill called the campaign the “Hinge of Fate.” “Before Alamein we never had a victory,” Churchill wrote, “After Alamein we never had a defeat.”¹⁰

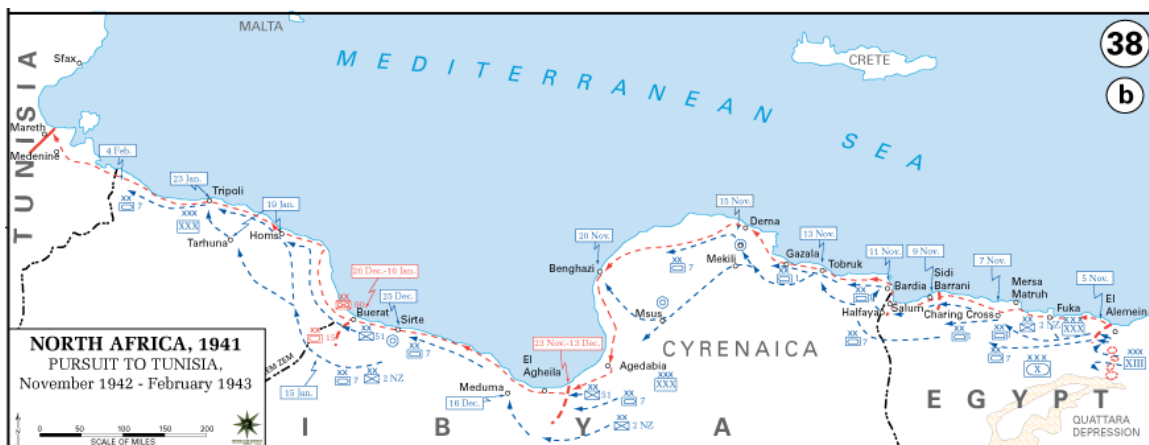


Figure 1. Pursuit to Tunisia. Adapted from US Military Academy Department of History, accessed March 8, 2015, <http://www.westpoint.edu/history/SiteAssets/SitePages/World%20War%20II%20Europe/WWIIEurope38Combined.gif>.

This version of history—the legend of Montgomery’s heroic leadership—is only part of the story of the Battle of El Alamein. In reality, fragile Axis supply lines rather than charismatic leadership held the key to victory in the Western Desert. Air Chief Marshal Arthur Tedder led the Royal Air Forces in the Middle East, and Air Marshal Arthur Coningham was commander of the Western Desert Air Force. Tedder and Coningham worked closely with their land counterparts,

⁹ Bernard L. Montgomery, *Eighth Army: El Alamein to the River Sangro* (Berlin: Printing and Stationery Services, British Army of the Rhine, 1946), 1-30; Cole, “Ninth Air Force,” 73-75, 80-85; Porch, *Path to Victory*, 370-414.

¹⁰ Winston S. Churchill, *The Second World War: The Hinge of Fate* (Boston: Houghton Mifflin Company, 1950), 603.

providing reconnaissance and direct support fires for the Eighth Army. However, they understood supply lines were the key. To attack them, they knew they needed long-range bombers. While the United States had long been supplying British forces with planes and supplies, direct American involvement in the North Africa Campaign did not begin until June 1942 when US Army Air Force Major General Lewis Brereton took command of the newly formed US Army Middle East Air Force. American bombers engaged in the ensuing war of logistics, targeting enemy oil fields, protecting shipping convoys, and raiding key port facilities.¹¹ Rommel's inability to resupply efficiently led to his desperate attack in August 1942, and it caused that attack to stall and fail. After repelling the offensive, Brereton's forces "kept up their relentless pounding of Axis supply ports and convoys."¹² By the middle of October, the Allies had achieved air superiority and created a critical imbalance in supplies between the forces. Even Montgomery's famed El Alamein offensive began with a four-day aerial bombardment to further prepare the battlefield. From October 19 to 23, British and American air forces struck targets at ports and airfields, conducted fighter sweep patrols, and fulfilled frequent army requests for attacks on vehicles and gun emplacements, as well as tactical reconnaissance. The air forces set the conditions for the Axis defeat, and had the potential to pursue and destroy the Panzer Army. Rommel's retreat, however, brilliantly outpaced Montgomery's pursuit. The Eighth Army could not build up airfields fast enough to keep the tactical fighter planes and bombers in range to attack the retreating forces. Instead, Rommel's forces survived and set up strong defensive positions. It took several bloody months and the additional forces from the Torch landings—who suffered a

¹¹ Kenn C. Rust, *The 9th Air Force in World War II* (Fallbrook, CA: Aero Publishers, Inc, 1967), 12; Cole, "Ninth Air Force," 4; Christopher M. Rein, *The North African Air Campaign* (Lawrence, KS: University Press of Kansas, 2012), 47-48.

¹² Cole, "Ninth Air Force," 40-41.

setback at Kasserine Pass before successfully linking up with the forces from El Alamein— finally to force the Axis forces in Africa to surrender in May 1943.¹³

Most Second World War literature pays scant attention to airpower's important role in the Western Desert Campaign. Books about the US Army Air Force's contributions focus instead on Operation Torch, Operation Overlord, the Doolittle Raid, or strategic bombing. Historians that specifically address the Battle of El Alamein define it as a showdown between Rommel's and Montgomery's land forces dueling on the African desert sands like two classic Greek wrestlers. For example, Correlli Barnett does not write about Coningham or Brereton in his book, *The Desert Generals*; instead, he focuses entirely on the ground forces. Biographies of the land generals are much the same, with little mention of the British and American air forces' contribution. Nigel Hamilton emphasizes Montgomery's personal leadership and charisma as the key to his success.¹⁴ While it acknowledges Montgomery's "appreciation of the need to command the sky," Ronald Lewin's biography centers on the Eighth Army's actions.¹⁵ Martin Kitchen's account of Rommel's actions in the Western Desert is much the same. Montgomery himself devotes little attention to the Royal Air Force's contributions. Even the memoirs of pilots who participated in the Western Desert Campaign gloss over key elements, leaving only disjointed discussion of command relationships, resource allocation, and targeting decisions. For example, Tedder and Brereton give their perspectives on day-to-day operations without revealing the organizational thought process behind such crucial decisions. Literature about the American role

¹³ Porch, *Path to Victory*, 370-414; Cole, "Ninth Air Force," 46-47.

¹⁴ David N. Spires, *Air Power for Patton's Army: The XIX Tactical Air Command in the Second World War* (Washington, DC: Air Force History and Museums Program, 2002); Thomas A. Hughes, *Overlord: General Pete Quesada and the Triumph of Tactical Air Power in World War II* (New York: The Free Press, 1995); General James H. Doolittle with Carroll V. Glines, *I Could Never Be So Lucky Again* (Atglen, PA: Schiffer Publishing Ltd, 1995); Overy, *Air War*; Correlli Barnett, *The Desert Generals* (Bloomington, IN: Indiana University Press, 1986); Hamilton, *Montgomery*, 20-29.

¹⁵ Ronald Lewin, *Montgomery: As Military Commander* (New York: Stein and Day, 1971), 61.

is particularly devoid of any such reflections: in his book about the desert air war, Royal Air Force pilot Richard Bickers devotes only a single paragraph to American forces.¹⁶

In terms of the campaign's operational approach, most historians agree that the desert campaign was really a war of logistics. Alan Levine, Richard Overy, and Stephen Bungay write extensively about the problems of supply lines in the desert, and the impact of logistics on both Axis and Allied operations. Similarly, Bungay and Brad Gladman explore the intelligence operations and breakthroughs that enabled the Allies to exploit German and Italian plans. Douglas Porch acknowledges air superiority and successful supply line interdiction as factors in Montgomery's victory, with no discussion of land-air coordination or planning. Likewise, Gerhard Weinberg mentions American bombers' shift from China to Africa, but does not address their effect on the campaign. The official US Army Air Force and Royal Air Force histories detail sortie types and bombing results, but none of these studies reveals the British and American planning methodology. They fail to show how commanders addressed problems associated with coalition—combined British and American—warfare, and most interestingly how they linked British and American air forces' effects to achieve campaign objectives.¹⁷

Admittedly, the American contribution got off to a slow start. The first US Army Air Force unit arrived in Egypt seven months after Japan bombed Pearl Harbor. It arrived with no doctrine for conducting expeditionary or coalition warfare. While US forces had operated on

¹⁶ Martin Kitchen, *Rommel's Desert War: Waging World War II in North Africa, 1941-1943* (New York: Cambridge University Press, 2009); Montgomery, *Eighth Army*, 9; Tedder, *With Prejudice*; Brereton, *Brereton Diaries*; Richard T. Bickers, *The Desert Air War: 1939-1945* (London: Leo Cooper, 1991), 99.

¹⁷ Alan J. Levine, *The War Against Rommel's Supply Lines, 1942-1943* (Westport, CT: Praeger Publishers, 1999); Overy, *Air War*; Bungay, *Alamein*; Brad W. Gladman, *Intelligence and Anglo-American Air Support in World War Two: The Western Desert and Tunisia, 1940-43* (London: Palgrave Macmillan, 2009); Porch, *Path to Victory*, 290-325; Gerhard L. Weinberg, *A World at Arms: A Global History of World War II* (Cambridge: Cambridge University Press, 1994), 355-63; Assistant Chief of Air Staff Intelligence, Historical Division, "The AAF in the Middle East: A Study of the Origins of the Ninth Air Force" (Short title: AAFRH-8), June 1945; Air Ministry, *The Second World War, 1939-1945, Royal Air Force: Air Support*, 1 Jan 1955; Cole, "Ninth Air Force."

foreign soil in Mexico and in Europe during the First World War, expeditionary operations in the Second World War had been limited so far to naval forces and Doolittle's Raid in the Pacific. Brereton's forces were the first Americans to enter the European Theater, and they integrated their operations with Coningham's Royal Air Force. Fighting as a coalition had its benefits, but also required extensive coordination in planning and cooperation in execution. With very little common doctrine to guide their efforts, Tedder, Coningham, and Brereton had to coordinate every aspect of air force employment while steering combat operations; their tactics, techniques, and procedures evolved throughout the campaign. Since each service reported directly to its own Chief of Staff, Tedder and Coningham cooperated with their land force commander counterparts, notably Auchinleck and Montgomery, to establish joint—inter-service—objectives and procedures. British and American commanders had to negotiate and agree upon everything—basing, desert training, force composition, command and control, procedures for handling air support requests from ground forces, target selection, and more. Clearly, air forces contributed tremendously to ultimate Allied success by both protecting ground forces from Axis air attack and brutally pummeling Rommel's supply lines until his forces were "an eggshell awaiting the hammer blow."¹⁸ The question remains, however: how did the Allied Forces in the Second World War Western Desert Campaign address the issues associated with joint and coalition warfare?

This study shows that leaders made crucial decisions regarding command relationships, basing, and resource allocation to fight effectively as a joint and coalition force. First, Montgomery and Coningham used co-located headquarters and liaison officers to overcome significant philosophical differences in the structure of the British versus American chain of command. According to the sanctioned beliefs codified in military doctrine, the British air forces and land forces each reported to a separate commander. These two commanders then worked together to plan and carry out a given operation, but neither was the direct superior of the other.

¹⁸ Gladman, *Intelligence*, 115.

For the Americans, the air commander was subordinate to the ground commander. Until Montgomery took command of the Eighth Army, the air-land cooperation upon which the British system relied was lacking. Reconciling the different doctrinal command relationships across the coalition and ensuring the service commanders shared a common strategic vision proved an important aspect of joint desert warfare. Effective basing for air forces formed a second aspect of joint and coalition warfare addressed by Allied leaders. Coningham's forces developed a technique to move operations to a new aerodrome quickly, which enhanced flexibility and operational reach—the closer the planes were to the battlefield, the farther in depth they could strike the enemy. However, Montgomery's slow pursuit of Rommel after El Alamein and a failure to integrate operations across the African continent resulted in missed opportunities. Finally, optimal allocation of limited resources was a third aspect of joint warfare that commanders addressed in North Africa. To shock and overwhelm the enemy, Coningham and Brereton used a systems approach to analyzing the Afrika Korps, attacking it with a combination of American bomber aircraft and improved close air support tactics. They optimized their air resources by targeting multiple aspects of Rommel's supply system rather than vainly searching for a single decisive point or center of gravity. Reconciling the philosophical differences in British and American command structures proved to be the first hurdle.

Command Relationships

Despite separate air and land command structures on the British side and forces flowing into theater with little doctrine or strategic guidance on the American side, the Allies in North Africa defeated Axis forces thanks to the shared vision and cooperation of individual commanders. From the fall of 1940 to the summer of 1942, the fighting in Africa became a strategic stalemate despite a significant British numeric advantage in personnel and equipment. An American military observer summarized the situation in a report to the US War Department after British forces surrendered the port of Tobruk on June 21, 1942. He wrote that no amount of American aid in the form of lend-lease equipment would enable the Eighth Army to overcome its leadership, tactical, and morale problems. “The only remaining certain and effective method of destroying Rommel,” the observer reported, “is to unify Air and Army commands, to reorganize the VIIIth Army [sic] under new leadership and new methods, to delay and to contain the Axis forces, [and] at the same time interrupt shipping so as to deny vital supplies to the Axis.”¹⁹ Despite, or perhaps because of the British separate services’ command philosophy, successive British ground commanders failed to exploit combined arms tactics to their full advantage. With nascent air force doctrine that conflicted with its British counterpart’s, American forces joined the effort in the summer of 1942 without specific guidance for their employment. Ultimately, a specific mix of individual commanders, willing to create relationships across services and nationalities at every level of command, found success. By the fall of 1942, American and British air and land commanders overcame conflicting doctrine to establish command and control relationships that fostered the unity of effort necessary to defeat Rommel’s army at El Alamein.

Between 1940 and 1942, British forces in North Africa maintained a separate command structure between land and air forces. Rather than consolidating forces under a single commander, the Royal Air Force in the Middle East reported to Tedder, while Auchinleck

¹⁹ Col Bonner Fellers, US military observer in the Middle East, quoted in Cole, “Ninth Air Force,” 8.

commanded the British army units (see Figure 2). Tedder and Auchinleck each reported to the British Chiefs of Staff. Neither of the independent services was subordinate to the other. The British forces generally achieved inter-service cooperation at the operational level, but friction in the field prior to Montgomery's arrival in August 1942 tested the command structure. While British naval leadership in the Mediterranean stubbornly refused to cooperate with either of the other services, Tedder and Auchinleck were in close contact throughout the campaign. They coordinated war plans, sought one another's counsel, and frequently traveled together to the front lines to assess or motivate their troops.²⁰ At the field command level, Coningham understood that "he and the Army were going to play one game in joint partnership, neither being dominant, with give and take on both sides."²¹ However, his land counterpart during the fall of 1941, Montgomery's predecessor Sir Alan Cunningham, lacked vision for air forces. With Cunningham in command, even basic coordination between the air and ground was lacking. He "would neither discuss his plans [with Coningham] nor even disclose them, except under extreme pressure."²² He wanted aircraft directly overhead, used only as a means to keep the German Luftwaffe from attacking his ground forces. An army officer told Tedder "how splendid everything in the Desert was, quoting as an example that he had seen forty of our fighters over headquarters at the same time."²³ Frustrated by this illogical attitude, Tedder could not understand why soldiers "were delighted if our fighters managed to protect them from interference, and yet they disliked being bombed themselves so much that they completely ignored the effect on the enemy of our bombing."²⁴

²⁰ Tedder, *With Prejudice*, 146-52, 194, 199-200, 231.

²¹ Roderic Owen, *Tedder* (London: Collins, 1952), 148.

²² Vincent Orange, *Tedder: Quietly in Command* (Portland, OR: Frank Cass Publishers, 2004), 163.

²³ Tedder, *With Prejudice*, 194.

²⁴ *Ibid.*



Figure 2. Command Relationships at El Alamein. In August, 1942, Alexander replaced Auchinleck as Ground Officer Commander in Chief, Middle East, and Montgomery assumed command of the Eighth Army.

To clarify the command relationships between air and ground forces, the British War Ministry published a directive titled “Direct Air Support” on September 30, 1941. The directive implemented air support control centers “to meet, modify, or reject requests for support.”²⁵ On October 7, 1941, Churchill published a second memorandum indicating that while all air forces were nominally under the command of one air commander, “when a battle was in prospect or in progress the [Air Officer Commander in Chief] was to give the [Ground Officer Commander in Chief] all possible aid irrespective of other targets, however attractive.”²⁶ These directives communicated Churchill’s intent regarding the relationship between air and land forces, but the British system still relied upon separate service commanders’ cooperation rather than a single unified chain of command in the field. Coningham agreed to reappportion more forces to support the army directly during the British offensive in the fall of 1941, but this removed pressure from

²⁵ Vincent Orange, *Coningham: A Biography of Air Marshal Sir Arthur Coningham* (London: Methuen, 1990), 80-82.

²⁶ Air Ministry, *Second World War*, 36.

enemy supply lines and aerodromes. Even then, the airpower was often ineffective; the army cancelled or aborted missions because it did not know where its own troops were. Coningham ruefully told Tedder “that the most intensive fighting on 10 December [1941] had been in the Advanced Air Headquarters, Western Desert—his fighting for targets.”²⁷ The lack of cooperation was apparent; as late as February 1942, army commanders placed a low priority on protecting airfields.²⁸ Tedder’s frustration was palpable: after asking for army support and cooperation at a meeting of army commanders, he “noted that to try and make an impression on the Army was rather like hitting a wall of cotton wool.”²⁹ The lack of a single field commander to direct all efforts exacerbated the friction between the air and land force commanders’ competing vision for air force employment. The British separate-but-equal command structure relied on personal cooperation between commanders, but prior to Montgomery ground commanders resisted Coningham’s attempts to establish unity of effort.

On the American side, the forces flowing into the theater had neither doctrine nor guidance for operational employment. They hesitated to follow the British example because the separate-but-equal command structure initially baffled American observers. In fact, American reports during and after the campaign revealed contradicting assessments, with no final verdict on the unity of command concept. The assistant military attaché in Cairo said that while “theoretically the [Royal Air Force] and British Army, although retaining their separate status, were to operate as a single command,” he claimed that “in actual practice this theory is unworkable.”³⁰ An official War Department summary of the campaign made a similar argument in 1943. It maintained that the air forces could have done more to help the Eighth Army.

²⁷ Tedder, *With Prejudice*, 203-6.

²⁸ Orange, *Tedder*, 171-72.

²⁹ Tedder, *With Prejudice*, 312.

³⁰ Maj G. G. Atkinson, interview, 19 Oct 1942, typed transcript, Call #142.052, IRIS #00115717, in the USAF Collection, AFHRA, Maxwell AFB AL.

Had the command been unified and the ground force commanders accustomed to commanding air power, the [Royal Air Force] would probably have been ordered to concentrate every plane on the decisive objectives... True military art lies in recognizing the critical moment, in making a sound decision, in integrating all available means into a single, balanced striking force, and in delivering this force against the enemy when and where he is weakest... It cannot be denied that the separate air role envisaged by the air commander is vital. But the ability to strike one great blow with all available means requires quick decision, accurate timing, and prompt execution; it is the ultimate function of command, not cooperation.³¹

In contrast, the US Army Air Force Commanding General's 1944 report praised the inter-service cooperation in Africa. The report called the Africa campaign "another lucid demonstration of the soundness of having an airman run the air war while a soldier runs the ground war – but always working together."³² These contradictory American perspectives on command structure reflected the evolution of doctrine throughout the campaign, and the resulting confusion in guidance at the strategic level for commanding air forces.

Throughout the campaign, evolving American doctrine for air employment reflected a tension in the principles of centralization of control and unity of command. On the one hand, centralized air resources could take advantage of flexibility and the ability to mass forces. Such centralization avoided risking expensive planes and pilots on minor objectives. Decentralization, on the other hand, gave subordinate army commanders unity of command over both land and air forces, and increased the responsiveness of air assets to ground commanders at lower levels.³³ While land and air advocates hotly debated this fundamental question, US Army Chief of Staff George C. Marshall moderated the more dramatic recommendations as the ultimate approving authority for all official doctrine. Published in 1940, Air Corps Field Manual 1-5 *Employment of*

³¹ Military Intelligence Service, War Department, "Notes and Lessons on Operations in the Middle East, Campaign Study No. 5" (Washington, DC: US Government Printing Office 1943), 23-24.

³² Report of the Commanding General of the Army Air Forces to the Secretary of War, January 4, 1944 (Washington, DC: US Government Printing Office, 1944), 42.

³³ Kent R. Greenfield, Robert R. Palmer, and Bell I. Wiley, *The Organization of Ground Combat Troops: United States Army in World War II* (Washington, DC: Historical Division, US Army, 1947), 113.

Aviation in the Army was equivocal. It stated that centralized control ensured maximum effectiveness of limited air resources, but that the commander may attach aviation to lower units “when decentralization becomes necessary in situations requiring immediate tactical support” so that “support aviation may thus act with greater promptness and better understanding in meeting the requirements of the supported unit.”³⁴ Similarly, the 1942 War Department Field Manual 31-35 *Aviation in Support of Ground Forces* represented a compromise that wavered between centralization and unity of command. Field Manual 31-35 made the air commander subordinate to the ground commander, and declared that the “most important target at a particular time will usually be that target which constitutes the most serious threat to the operations of the supported ground force. The final decision as to priority of targets rests with the commander of the supported unit.”³⁵ However, the authors “understood that it was theoretically based, that combat experience was needed to validate doctrine, and that leaders would interpret it in light of specific campaigns.”³⁶ In January 1943, the War Department postponed its revision of Field Manual 31-35 until the concepts could be further fleshed out with American wartime experience.³⁷ American air-land integration doctrine was in its infancy.

Not only was its doctrine incomplete, but US strategic leaders also gave very little guidance to their air forces in Africa. Throughout the summer and early fall of 1942, the US Chiefs of Staff focused their attention on planning Operation Torch. While the Americans honored the British request for bombers, the June 1942 agreement between the Commanding

³⁴ Air Corps Field Manual (FM) 1-5, *Employment of Aviation in the Army* (Washington, DC: Government Printing Office, 1940), 22.

³⁵ War Department Field Manual (FM) 31-35, *Aviation in Support of Ground Forces* (Washington, DC: Government Printing Office, 1942), 11.

³⁶ Daniel R. Mortensen, *A Pattern for Joint Operations: World War II Close Air Support North Africa* (Washington, DC: US Government Printing Office, 1987), 23.

³⁷ Daniel R. Mortensen, “The Legend of Laurence Kuter,” in *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940-1943*, ed. Daniel R. Mortensen (Maxwell Air Force Base, AL: Air University Press, 1998), 110.

General of the US Army Air Force, Lieutenant General Henry H. Arnold, and the British Assistant Chief of the Air Staff, Air Vice Marshal John Cotesworth Slessor, stipulated that only Americans should fly American aircraft. This arrangement ensured that America would not bear the expense while the Royal Air Force took the glory. It also introduced peculiar issues over command relationships within the coalition. The first Americans to take part in the North Africa campaign were Colonel Harry Halverson's detachment of twenty-three B-24Ds, temporarily diverted from their secret mission to attack Japan from China. As the detachment, code named Halpro, ferried the planes along a southern route to China, Washington seized an opportunity for a moral victory similar to the Doolittle Raid in Japan. On June 12, 1942, Halpro raided Romanian oil refineries at Ploesti from a temporary stopover base in Egypt. The attack did not inflict significant physical damage, but the raid proved that even while Rommel was pushing the British toward El Alamein, American forces could strike the Axis in Europe. On June 15, Halpro attacked Italian warships and caused them to withdraw, successfully protecting a British convoy resupplying forces on Malta.³⁸ Following these attacks, Halverson cautioned the Operations Division of the War Department, "one more cooperative mission will so deplete [Halpro] that it cannot accomplish [its] primary mission" in Japan.³⁹ The Operations Division responded that the Japan mission was over; Halpro would "continue to function in the Middle East in connection with British operations, but not for local tactical use."⁴⁰ This vague guidance left the commander room for interpretation. Despite Halverson's appeals to allow him to coordinate directly with the British, the War Department directed Halverson to report to Brigadier General Russell L.

³⁸ Overy, *Air War*, 64; Proceedings of the Chiefs of Staff Conference, December 24, 1941, 2, Box 1, Combined Chiefs of Staff: Conference Proceedings, 1941-45, Dwight D. Eisenhower Presidential Library; Rein, *Air Campaign*, 46; Levine, *Rommel's Supply Lines*, 29-30; Rust, *9th Air Force*, 11; Cole, "Ninth Air Force," 4.

³⁹ Thomas T. Handy, June 18, 1942, File A67-20, Box 1, US War Department, Operations Division: Diaries, 1942-1946, Dwight D. Eisenhower Presidential Library.

⁴⁰ *Ibid.*, June 19, 1942.

Maxwell, the first commander of the newly formed US Army Forces in the Middle East. Maxwell had been in Cairo supervising the American lend-lease support to the British since November 1941, and now his command included Army personnel in North Africa and Iran as well as Halpro air forces. Later in June 1942, the War Department sent Brereton, together with his heavy bombers, from India to Egypt. Maxwell created the US Army Middle East Air Force and named Brereton as its commander. Again, the War Department clarified that while the units would employ with the British, Brereton would retain command, reporting to Maxwell who would then coordinate with Auchinleck and Tedder. Initially, Brereton balked at a command structure that placed Maxwell, a ground commander with no air experience, between him and his Royal Air Force counterpart. In practice, however, a cordial relationship between Brereton and Maxwell allowed direct cooperation between Brereton and Coningham. After assigning forces and establishing the command structure, however, the War Department gave no further guidance on how the American and British forces should employ together in Libya and Egypt. Instead, the Combined Chiefs of Staff turned their attention to Operation Torch. So completely did they turn their attention away from Egypt, there was surprisingly little coordination between the two campaigns.⁴¹

With separate air and land command structures on the British side, and forces flowing into theater with little doctrine or strategic guidance on the American side, the coalition owed its success to the shared vision and cooperation of Coningham and Montgomery. Despite their differences, the service commanders made the concept of co-equal command work effectively. Montgomery wrote that the Army “cannot fight successfully on land without the closest

⁴¹ Handy, June 17, 1942, June 23, 1942, June 27, 1942; Clayton R. Newell, “Egypt-Libya: 11 June 1942-12 February 1943,” US Army Center of Military History, October 2003, 11.

cooperation of the [Royal Air Force].”⁴² “If Air is placed under a Ground commander its flexibility will be destroyed,” Montgomery said, “because the air power will be disseminated or divided between the...sectors of the ground forces... Moreover, Air is a weapon of its own characteristics and peculiarities, requiring its own skill, just as ground fighting requires its own skill.”⁴³ When asked whether the British had achieved any unity of command by the summer of 1942, an American special observer responded, “No – not in that respect. They always had a Navy commander, an Army commander, and an Air commander. But they worked very closely [together].”⁴⁴ Churchill concurred; he wrote that in the summer of 1942 “the relations between the Air Command and the new [army] generals were in every way agreeable.”⁴⁵ This overly optimistic assessment did not foreshadow the exasperation and contempt Tedder and Coningham eventually felt toward Montgomery. At the time liaison officers throughout both services and a shared headquarters allowed the air and land commanders to find success.⁴⁶

Liaison officers provided a crucial facet of army-air force integration capability. Their purpose was to increase understanding, communication, and coordination between the services at the tactical fighting echelons, thus enhancing joint forces’ effectiveness. The liaisons were army officers, “specially-trained to explain air methods to soldiers, army methods to airmen, and—as

⁴² Bernard L. Montgomery, “Some Brief Notes for Senior Officers on the Conduct of Battle,” 31 Dec 1942, Call #168.7020-21, IRIS #00126355, in the Watts S. Humphrey collection, AFHRA, Maxwell AFB AL, 4.

⁴³ Bernard L. Montgomery, quoted in Oral History Interview of Lt Col P. M. Barr, Operational Intelligence, 12 May 1943, typed transcript, Call #612.620-2, IRIS #00242445, in the USAF Collection, AFHRA, Maxwell AFB AL.

⁴⁴ Oral History Interview of Col Demos T. Craw, Special Observer assigned by Gen Arnold to Halpro Mission, 3 Jul 1942, typed transcript, Call #142.052, IRIS #00115746, in the USAF Collection, AFHRA, Maxwell AFB AL, 3.

⁴⁵ Churchill, *Hinge of Fate*, 586-87.

⁴⁶ Vincent Orange, “Getting Together,” in *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940-1943*, ed. Daniel R. Mortensen (Maxwell Air Force Base, AL: Air University Press, 1998), 21; Orange, *Coningham*, 106.

they became experienced and confident—to explain why things went wrong and how best they could be put right.”⁴⁷ Although the program began in December 1941, it did not reach full staffing and effectiveness until the summer of 1942. Each fighter group had two army liaison officers with radio communication links to the troops on the ground. The liaison bridged the gap between the pilots’ understanding of the ground situation, and the soldiers’ understanding of air capabilities and limitations. The liaison passed information about land forces’ positions, and often provided feedback regarding the effectiveness of an airstrike with more detail and accuracy than the pilots could determine from the air. Additionally, Coningham assigned Royal Air Force officers to armored divisions to aid in communication and establish trust between soldiers and aviators. While liaison officers added to the trust between air and land forces, the commanders also instilled confidence among the coalition troops by keeping them informed of the joint plan. American forces fought under British direction, and in many cases, they flew alongside the British as part of combined units. The close personal relationship between Brereton, Tedder, and Coningham enabled the cooperation between the American and British air units. Tedder’s straight-talk and concern for the troops—Brereton said Tedder visited every American unit almost as often as he did—won the Americans over. Montgomery and Coningham routinely traveled to talk with their units on the ground. Throughout the Eighth Army, every soldier knew the details of the upcoming battle and his role in the fighting. The same was true for the air forces. For example, in the days before the Battle of El Alamein, Coningham visited every squadron and talked about Montgomery’s strategy, objectives for air forces, and their role in the overall plan. This understanding of the big picture, promulgated by both commanders and

⁴⁷ Orange, *Coningham*, 82-83.

liaisons, was crucial for morale and played a large role in motivating both ground and air troops.⁴⁸

A co-located headquarters was a crucial second step to align the air and land strategies and enable the commanders to develop a shared vision. Coningham realized that long-distance communication limitations required in-person joint planning and coordination in order to achieve effective results. One service could not fully understand the other's plans, objectives, limitations, and capabilities without the easy communication, strong personal relationships, and collaboration a side-by-side headquarters enabled. Due to the shifting nature of the front lines throughout the campaign, the location of the advanced and rear headquarters often changed. The various commanders had different views on the importance of co-location. The naval leadership, for example, refused to change venue, and did not even provide liaison officers to other component headquarters. Unlike his predecessors, Montgomery shared Coningham's belief that the army and air headquarters should be co-located. As soon as he took command, Montgomery magnanimously moved his headquarters to Coningham's, demonstrating his conviction. Housing the staffs in the same compound meant the officers were in constant contact with their joint counterparts. At every echelon, the staffs ate at the same mess, worked in adjacent operations rooms, and shared equipment and supplies. This afforded better planning, coordination, and communication at all levels of command.⁴⁹ Coningham wrote that this arrangement "was of fundamental importance and had a direct bearing on the combined fighting of the two Services

⁴⁸ Orange, *Coningham*, 82; Oral History Interview of Maj P. R. Chandler, Intel officer, 57th Ftr Gp, 66th Ftr Sq, 17 Jun 1943, typed transcript, Call #142.052, IRIS #00115736, in the USAF Collection, AFHRA, Maxwell AFB AL; Roderic Owen, *The Desert Air Force* (London: Hutchinson and Company, 1948), 110; Headquarters VIII Air Support Command, "Air Operations in Support of Ground Forces in North West Africa: 15 March -5 April 1943" (US Army, May 20, 1943), 8, 13, File A67-22, Box 48, Walter Bedell Smith Collection of World War II Documents, 1941-1945, Dwight D. Eisenhower Presidential Library; Newell, "Egypt-Libya;" Orange, "Getting Together," 4-5; Oral History Interview of Lt Col P. M. Barr.

⁴⁹ Tedder, *With Prejudice*, 146-52, 231; Orange, "Getting Together," 20; Owen, *Desert Air Force*, 110.

until the end of the War.”⁵⁰ Montgomery agreed: “the tremendous power of the air arm in close co-operation with the land battle was well demonstrated in the [August 30, 1942 Battle of Alam Halfa]; the Army and Air Force worked to a combined plan, made possible because the Army and Air Commanders, and their staffs, were working together at one Headquarters.”⁵¹ The joint control center—first implemented by the British War Ministry’s “Direct Air Support” directive of September 1941—furthered the concept. However, the air support control centers were most effective after Coningham and Montgomery instigated the co-located headquarters. Under the Royal Air Force centralized air command system, the individual ground units could request, but not demand assistance from air. The air staff, with the advice and expertise of the ground staff close by, could then sort the requests and fill them from centrally directed air forces. They provided communication between the ground and air units at each level of command: every ground unit had a communications center that was able to contact the joint control center directly. The center acted as a clearinghouse for air support requests. It sifted through them, rejected those that exceeded available resources or capabilities, and forwarded the rest to the air headquarters to fulfill. The integration and close communication across the services provided by the co-located headquarters and joint control centers furthered unity of effort.⁵²

With no explicit unity of command on the British side, and a lack of doctrine and guidance on the American side, individual leaders made the difference in command and control in the desert. While the US doctrine for air-land cooperation was initially insufficient, it continued

⁵⁰ Arthur Coningham, “The Development of Tactical Air Forces,” *RUSI Journal* 91 (1946), 213, quoted in Orange, *Coningham*, 79.

⁵¹ Montgomery, *Eighth Army*, 9.

⁵² Overy, *Air War*, 68; Orange, *Coningham*, 80-82; Bernard C. Nalty, “The Defeat of Italy and Germany,” in *Winged Shield, Winged Sword: A History of the United States Air Force, Volume I 1907-1950*, ed. Bernard C. Nalty (Washington, DC: Air Force History and Museums Program, 1997), 273; Thomas A. Hughes, “Air Lines: Anglo-American Tactical Air Operations in World War II,” *Air and Space Power Journal* (Winter 2004), accessed October 23, 2014, <http://www.au.af.mil/au/afri/aspj/airchronicles/apj/apj04/win04/hughes.html>.

to evolve throughout the war and after. An intelligence summary after the war concluded that the “Western Desert provided a proving ground for both tactical and organizational developments of far-reaching influence on the growth of Allied doctrines of air-ground cooperation.”⁵³ In stark contrast to previous Eighth Army commanders, Montgomery planned and fought together with the air forces. The constant partnership between Coningham and Montgomery created the conditions for success. Because of their cooperation in planning and execution, facilitated by liaisons throughout their organizations and co-located headquarters, Coningham, Brereton, and Montgomery overcame conflicting doctrine to establish command and control relationships that fostered unity of effort. The next step was properly positioning their forces to achieve success.⁵⁴

⁵³ Cole, “Ninth Air Force,” 21.

⁵⁴ David I. Hall, “Learning How to Fight Together: The British Experience with Joint Air-Land Warfare,” research paper (Air Force Research Institute, 2009), 20, accessed October 23, 2014, http://www.au.af.mil/au/aupress/digital/pdf/paper/ap_0004_hall_learning_fight_together.pdf.

Basing

In addition to addressing command relationships, Allied leaders faced a second crucial aspect of joint and coalition warfare: effectively basing their air forces. In selecting basing locations, leaders had to manage the tension between reach and security, while balancing flexibility with operational efficiency. First, Coningham's team developed a successful technique for rapidly setting up and tearing down airfields in the months leading up to El Alamein. The system required extra effort from air support forces, but enhanced the campaign's overall effectiveness. However, Montgomery's excessively ponderous pursuit and reluctance to capture airfields aggressively after El Alamein let Rommel escape air attack. Without realizing his potential advantage from the air, Montgomery's heel dragging thus stifled his own greatest offensive weapon and enabled significant numbers of Axis forces to escape to Tunisia where they continued to fight until May 1943. Finally, the Allies missed a chance to leverage the theater-wide basing opportunities that Operation Torch could have provided. Since the Allies neglected to integrate the Torch landings in the west with Montgomery's attack and pursuit from the east, they wasted an opportunity to force an earlier Axis defeat in Africa.

Allied air commanders in North Africa had to devise efficient ways to relocate aerodromes in response to the rapidly changing battle lines. In the open terrain of North Africa, mobility was crucial not only for ground forces but also for air forces. The limited range of fighter aircraft in particular and the need to save precious fuel meant airfields were most efficient, and therefore effective, when located near the front lines. In 1942, a P-40 fighter's range was only 240 miles. An airfield near the battlefield meant short-range aircraft could still attack targets in the enemy's immediate rear, including supply convoys and reinforcements. In this way, the forward airfields extended the commander's reach. They also provided flexibility for the ground forces. Proximity to the front lines reduced response time for air forces reacting to requests for direct air support during engagements. On the other hand, establishing air bases near the battlefield increased the risk to those aircraft and personnel—being closer to the enemy also

resulted in the enemy being closer to friendly forces. Air base security was thus a crucial part of location decisions. In North Africa, the Eighth Army was responsible for the physical security of the airfields, and for Montgomery's predecessors, securing airfields was a low priority. In response to a lack of airfield defense troops from the army, Coningham would send his own personnel forward in armored cars as a screening force. He recalled at least two occasions when his screening force warned aerodromes to evacuate when they discovered advancing enemy land forces that might have otherwise destroyed the fighter force on the ground. Montgomery, on the other hand, was willing to place a higher priority on airfield security. He had a keener understanding of the symbiotic relationship between air and land forces, and the corresponding importance of aerodrome defense.⁵⁵

As the front line ebbed and flowed over the three years of the desert campaign, Coningham constantly adjusted air base locations to maximize his force's effectiveness. At the same time, each airfield movement disrupted air operations as support personnel shut down the old base and prepared the new one. To counter inefficient disruptions, Coningham's team developed a novel concept for airfield mobility. Obviously, the airplanes themselves were inherently mobile. Airfield support was a different story. Preparing a new base, ready to not only receive the aircraft and support immediate operations but also ready to move to yet another new airfield was "a real and amazing achievement."⁵⁶ To make this achievement possible, Coningham split the air force support units into two groups, designated "A" and "B," each with similar equipment and personnel. Either support group was independently able to maintain the entire flying squadron for up to three days. When a change in the front line necessitated an airfield move, the "A" group would move to the new base to set up operations and be ready to receive the planes as they landed from their missions. Once "B" group had launched the planes from the

⁵⁵ Orange, *Coningham*, 100-104.

⁵⁶ Owen, *Desert Air Force*, 102.

original base, they would close down the airfield and move to the new airfield. In some cases, the “B” squadron would “leapfrog” ahead, skipping the airfield where “A” was located and instead initiating operations at an even farther forward location. The units required only four hours advance notice to begin such airfield mobility operations. From a narrow view of just airfield operations, the division of resources was less than optimal. From a broader perspective, however, the technique made operational sense. Coningham’s air forces sacrificed their own efficiency by splitting their operations, but the effort ultimately resulted in better flexibility and contribution to the overall campaign.⁵⁷

While the leapfrog basing technique initially kept the enemy within fighter-bomber aircraft range in the aftermath of the Battle of El Alamein, the Allies’ pusillanimous pursuit allowed Axis forces to escape to Tunisia. First, they missed a key opportunity to take advantage of their Egypt-based bombers at the end of the Battle of El Alamein. The enemy was well within the range of these bombers. Yet from November 4-10, 1942, with Rommel’s forces beginning their retreat, the army was slow to pursue and exploit the advantage. Heavy rains hampered the army’s mobility, but Montgomery’s tactical philosophy was also to blame. Since his arrival in theater in August 1942, he focused on retraining the Eighth Army in highly centralized combined arms maneuver warfare. While these cautious tactics minimized the mistakes that led to earlier British defeats from 1940-1942, they failed to leverage the Axis’ desperate logistics situation, the changed tactical situation, and the vast advantage of air superiority. Montgomery and Coningham planned a coordinated effort for the attack at El Alamein, and a separate coordinated effort for the ensuing pursuit. However, they did not plan for the overlap of the attack and pursuit phases. According to Churchill’s 1941 directive, air forces must give all possible aid to land forces during a battle. Until Montgomery was ready to consider the battle over, Coningham was obliged to

⁵⁷ Cole, “Ninth Air Force,” 31; Orange, *Coningham*, 91-92, 104; Oral History Interview of Lt Col C. V. Whitney, Asst A2 for 9th Air Force, A2 for US Desert Air Task Force, 22 Apr 1943, typed transcript, Call #612.620-2, IRIS #00242445, in the USAF Collection, AFHRA, Maxwell AFB AL; Owen, *Desert Air Force*, 86-88, 124-5.

follow his lead. This meant that rather than using his limited fighters to escort bomber aircraft that could destroy vulnerable forces in the confused paralysis of their retreat, Coningham instead had to employ the fighters to defend friendly forces from air attacks that never came. The enemy air force was in shambles, short of fuel and highly disorganized. Montgomery failed to recognize that his overwhelming air superiority had significantly changed the balance of firepower and mobility. Soon, the Axis forces escaped outside the bombers' range. With the opportunity squandered, Rommel began to slip away.⁵⁸

The second basing misstep occurred later in the pursuit. In the early stages of Rommel's retreat, leapfrogging forward to bases in close proximity to the retreating army enabled relentless air attacks that forced the Axis to disperse their forces and travel primarily by night. This slowed the retreat, aiding the Allied ground pursuit. As the retreat progressed, however, Montgomery did not advance quickly enough to keep Coningham's aircraft in range. Fearing another reversal, he preferred a cautious, deliberate pursuit that would prevent the enemy from counter-attacking. Instead, his delays gave Rommel's forces reprieve and allowed them time to lay minefields, destroy infrastructure, and develop defensive positions during the retreat.⁵⁹ Montgomery's paranoia over an Axis counter-attack was absurd. With his fuel severely depleted, his air force scattered, and any reinforcements dedicated to opposing the Operation Torch forces to his west, there was "no possible question of Rommel staging a counter-stroke."⁶⁰ In fact, Montgomery misunderstood his own position regarding aerial combat strength. He focused on constructing airfields, but only to the extent needed to protect his own troops from attack, when in fact the

⁵⁸ Bernard L. Montgomery, *The Memoirs of Field-Marshal the Viscount Montgomery of Alamein* (Cleveland: The World Publishing Company, 1958), 127-30; Jonathan M. House, *Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization* (Washington, DC: US Government Printing Office, 1984), 86-96; Air Ministry, *Second World War*, 36; Orange, *Coningham*, 115-18.

⁵⁹ Cole, "Ninth Air Force," 69-75; Montgomery, *Eighth Army*, 34-50; Lewin, *Montgomery*, 100-102.

⁶⁰ Barnett, *Desert Generals*, 293.

Axis air force was hardly a threat. At the same time, he did not recognize the superior offensive capability that air superiority provided. Rather than slowing his pursuit to build enough combat power to mount a frontal ground assault, he could easily have enveloped Rommel's fuel-starved forces and cut off their retreat. Instead, his pace was painfully slow. Since Montgomery delayed moving supply depots forward, the air forces trekked fuel and supplies hundreds of miles back and forth from rear supply bases, wasting precious time and fuel in the transit. Coningham recalls several times when his units landed up to fifteen miles in front of the Eighth Army, only to turn and find Montgomery's forces advancing slowly, still searching for mines. Because of the army's caution, in this advance, air forces led the way. In short, Montgomery underestimated his advantage and thus insisted on a series of methodic frontal assaults punctuated by agonizingly long operational pauses. His failure to capture and secure appropriate air bases to extend his offensive reach, together with his unwillingness to move supply depots forward hamstrung Coningham's forces and thus delayed Rommel's defeat.⁶¹

Finally, the Allies' failure fully to integrate operations across the theater resulted in missed opportunities to leverage their basing advantage. As the Eighth Army pushed the Afrika Korps from Egypt west toward Tunisia, Eisenhower orchestrated Operation Torch on the west coast of Africa. The two operations formed a giant "pincer" across the continent, but the planners treated the efforts as completely separate campaigns. In fact, Allied headquarters devised "no overall policy or plan of campaign...for either the ground or the air war in North Africa."⁶² Eisenhower and his staff planned the Operation Torch landings giving hardly any thought to the Eighth Army. The British favored pushing the Torch landings eastward to capture Tunisia quickly, but they abandoned the concept due to a lack of air cover for their supply line through Gibraltar. Similarly, Churchill directed Montgomery to initiate the offensive at El Alamein in

⁶¹ Montgomery, *Eighth Army*, 37-46; Owen, *Desert Air Force*, 128-30; Kitchen, *Rommel's Desert War*, 380-90; Lewin, *Montgomery*, 112-19; Orange, *Coningham*, 120.

⁶² Porch, *Path to Victory*, 390.

September, in order to synchronize with the Torch landings November 8. Montgomery responded that his forces would not be ready until October. Short of a general awareness of the Torch landing date on Montgomery's part, there was no further discussion of orchestrating operational timing between the two campaigns. The planners held each sub-theater in isolation, as a closed system. In reality, they were operating with open systems. Torch and El Alamein were interconnected and interdependent in relation to each other, not just in the context of the global war. While the continent's expanse may have prohibited immediate direct support between the two operations, a well-integrated theater-wide campaign could have provided complimentary indirect effects to achieve the strategic objectives more quickly, at less cost. Instead, there was no direct coordination between Eisenhower and Tedder or General Harold Alexander, the new Commander in Chief Middle East.⁶³ Rather than integrating their efforts throughout the campaign, the two separate operations barely managed to keep their forces from running into each other as the Eighth Army pursued Rommel from the east and Torch forces attacked from the west.⁶⁴

From a resource standpoint, both the Axis and the Allies realized the operations were interconnected. For example, the Germans diverted supplies to its forces in the west after the Torch landings, which further "starved the Afrika Korps when its need was most urgent."⁶⁵ The

⁶³ Hammond, *El Alamein*, 90-104. In June 1942, Auchinleck fired the latest in a string of failed Eighth Army commanders and took over the position himself. Underwhelmed by Auchinleck's lack of confidence and reluctance to initiate a counter-offensive in his dual-role as Eighth Army Commander and Commander in Chief Middle East, Churchill replaced Auchinleck with Montgomery as Eighth Army Commander in August 1942. Churchill feared a personality conflict would make it impossible for Auchinleck to remain as Middle East Commander, directly in charge of Montgomery's Eighth Army. Churchill therefore replaced Auchinleck with Alexander as Commander in Chief Middle East.

⁶⁴ Montgomery, *Memoirs*, 106-107, 119-20; Russell F. Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington: Indiana University Press, 1973), 322-23; Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*, 2nd ed. (Amsterdam: Elsevier, 2006), 30-32.

⁶⁵ Lewin, *Montgomery*, 121.

Allies, for their part, held the newest aircraft—Spitfires, Bristol Beaufighters, and P-38 Lightnings—in reserve for Torch rather than allocating them to Coningham during the summer of 1942, as Tedder advocated. In September 1942, with a general understanding that air superiority in Egypt would influence Operation Torch, Eisenhower voiced support for sending P-40s to Coningham’s aid.⁶⁶ Besides this belated and solitary request, however, there were no further references to the Western Desert campaign in Eisenhower’s personal papers prior to Torch, nor was there any mention of the Eighth Army or Coningham’s air forces in the Torch planning documents.⁶⁷ Tedder did travel to Eisenhower’s headquarters in late November 1942 to coordinate air efforts with Torch requirements, but this meeting occurred after both the Torch landings and the Battle of El Alamein. Similarly, at the Casablanca Conference in January 1943, Allied leaders wrestled with the issue of reconciling the two different command structures as the American Twelfth Air Force from Torch and Coningham’s predominately-British air forces moving west from El Alamein prepared to converge in Tunisia. To merge the two systems, the Casablanca Conference designated Tedder as the Commanding Air Officer in the Mediterranean for operations. To bring the land forces together, the same Conference named Alexander Deputy Commander-in-Chief of the Allied Forces in French North Africa. Again, however, this integration was far too little, and well too late. By then, they had already missed the opportunity to take advantage of the “pincer” effect Torch could have provided. The Torch landings opened

⁶⁶ Tedder, *With Prejudice*, 369-71; Orange, “Getting Together,” 22; Butcher, September 19, 1942.

⁶⁷ Coningham’s Royal Air Force units worked in close coordination with Brereton’s US Army Middle East Air Force, which was renamed Ninth Air Force on November 1, 1942. For the remainder of the section, “Coningham’s air force” will refer to both the Royal Air Force and Brereton’s Ninth Air Force units.

air bases that could have significantly extended Coningham's reach, if only the two forces had integrated their planning.⁶⁸

Indeed, effective basing for air forces was an important aspect of joint warfare that Allied leaders addressed—with varying success—in North Africa. Coningham's leapfrog technique provided flexibility and maneuverability to keep aircraft close to the front lines, where they could not only respond rapidly to ground forces but also extend their reach to target the enemy's reinforcements and supply. At the same time, air forces depended on ground forces to secure the bases. Montgomery's slow trek west across the desert crippled Coningham's ability to attack Rommel's retreating army. Finally, Eisenhower's Torch landings provided an opportunity to mitigate the Eighth Army's cautious pursuit, but a failure to integrate campaigns negated any advantage the Allies might have gained from the additional basing options this operation provided. Eisenhower's forces not only lacked a theater-wide strategy, they were also slow to adopt Montgomery's and Coningham's tactics and techniques for effective air and ground close coordination. The Americans could have benefited tremendously from the lessons—of command relationships, basing, and resource allocation and targeting—the Allies had already learned in North Africa.

⁶⁸ John C. Warren, *USAF Historical Studies #74: Airborne Missions in the Mediterranean: 1942-1945* (Maxwell Air Force Base, AL: Air University, 1955); Mediterranean Allied Air Forces Headquarters, Historical Section, "Air Power in the Mediterranean: November 1942-February 1945" (1945), 57; David R. Mets, "A Glider in the Propwash of the Royal Air Force?" in *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine, 1940-1943*, ed. Daniel R. Mortensen (Maxwell Air Force Base, AL: Air University Press, 1998), 60-61; Lewin, *Montgomery*, 121.

Resource Allocation

Rather than throwing all their air resources against a single perceived decisive point or center of gravity, the British and the Americans effectively used their available assets along multiple lines of effort to shock the enemy's system. Three elements were crucial to this outcome. First, American bombers that began to arrive in the summer of 1942 provided the reach that made offensive bombing possible for the first time in the North African theater. Second, close air support tactics continued to improve throughout the campaign. Third and most importantly, the Allies improved their ability to combine the bomber and close air support efforts. Conventional wisdom advocated massing resources against the root sources of the enemy's strength—its center of gravity. For air enthusiasts this was the strategic bombing of factories or targeting the morale of populations. For land proponents, it consisted of fielded forces. Coningham and Montgomery, however, demonstrated an understanding of the enemy as a system. They chose to attack at multiple points, from multiple domains, rather than focusing on any one thing. By correctly identifying and attacking the operational centers of gravity, rather than focusing exclusively on population morale or myopically on front-line forces, the American and British forces were able to defeat Rommel at Alam Halfa and El Alamein.

Prior to the summer of 1942, a lack of bombers denied the Royal Air Force in Africa the ability to strike targets much beyond the enemy's front line. When the Italians attacked British forces in Africa in the summer of 1940, defending Egypt and the Suez Canal were the primary British goals. The bulk of air and naval assets, however, had to remain in Britain to defend the British homeland from the raids of the German Luftwaffe and navy. Thus, the aircraft allocated to the Middle East could fly only in defensive and reconnaissance roles because there were simply not enough available to execute a credible offensive. Throughout 1941, Tedder repeatedly requested heavy bombers to attack Axis shipping and ports. Charles Portal, the Chief of Air Staff on the Combined Chiefs of Staff, however, retained all available bombers to support Bomber Command in Europe. At the same time, the Combined Chiefs pulled entire air units from Tedder

to send to India in anticipation of a possible Japanese offensive that never materialized. This paucity of resources began to change when the Germans seized Tobruk on June 21, 1942. In order to prevent the collapse of the Middle East, the Chiefs began to send more tanks to the British Eighth Army and bombers to the Royal Air Force in Africa.⁶⁹ In the summer of 1942, American leaders joined the effort to lobby for bombers in Africa. Brereton recommended to the War Department the “accelerated dispatch of air forces now planned for Middle East and dispatch of further units...to have the following objectives: 1) Defeat of Rommel, 2) securing control of the Mediterranean, and 3) sustained air action over Italy, the Romanian oil fields, the Caucasian oil fields, if captured, and other strategic areas within range.”⁷⁰ The War Department concurred; both Halverson’s Halpro unit and Brereton’s bombers would remain in the Mediterranean theater.⁷¹ Eisenhower realized that “military strength, particularly in the air, in Egypt, has a direct influence on TORCH both eventually and during the first critical month of the campaign.” He “expressed the earnest hope that the [United States] can quickly send P-40s to the Middle East in quantities to bring British squadrons to operational strength.”⁷² While even Eisenhower advocated sending US bombers to prevent a British collapse, once the Allies held Rommel at Alam Halfa, the Americans again turned their attention to Torch.

In the meantime, these bombers extended British reach in North Africa, finally enabling Coningham and Montgomery to target consistently elements of the enemy system beyond the front lines. While Allied planes occasionally struck ports in southern Italy from their bases in Malta and Greece between 1940 and 1942, Rommel’s major supply lines were out of reach for

⁶⁹ Overy, *Air War*, 41; Tedder, *With Prejudice*, 353; Weinberg, *World at Arms*, 356.

⁷⁰ St. Clair Streett, August 5, 1942, File A67-20, Box 1, US War Department, Operations Division: Diaries, 1942-1946, Dwight D. Eisenhower Presidential Library.

⁷¹ *Ibid.*, August 21, 1942.

⁷² Harry C. Butcher, September 19, 1942, Box 165, Dwight D. Eisenhower: Papers, Pre-Presidential, 1916-52, Principal File, Dwight D. Eisenhower Presidential Library.

Cunningham's forces in Africa. The first Halpro target, the Ploesti oil field refineries in Romania, represented the single greatest Axis source of fuel. While the B-24 attack served as a moral victory, the Allied losses were unsustainable and Ploesti went untouched until later in the war. After Ploesti, the Halpro detachment struck port facilities in Benghazi and Tobruk throughout June and July 1942. As his forces arrived in theater, Brereton's B-25 bombers struck Luftwaffe air bases and supply convoys behind enemy lines in an effort to gain air superiority and limit Rommel's options as his supplies dwindled. To this end, their creative tactics took the Axis by surprise. For example, on October 27, 1942, American pilots flying P-40 aircraft took off in the early morning darkness with the airfield lit by truck headlights, and arrived at their undefended target airfields at dawn. They destroyed German and Italian aircraft on the ground as well as trucks and tents. The fighter-bombers repeated these pre-dawn missions twice more, playing a crucial role in Allied air superiority during the battle of El Alamein. While the bombers' insufficient range, limited escort fighters, and slow intelligence analysis of targets still restrained air planners, American bombers widened the aperture for Cunningham's air forces and allowed him to influence a greater portion of the enemy's system.⁷³

Bombers enhanced Allied reach, but tactical improvements also aided the close air support fight for the British forces in Africa. One area of tactical improvement involved training incoming forces in the specifics of desert warfare. By the time American pilots entered the theater in 1942, the Royal Air Force had been fighting in the desert for two years. The green Americans were able to profit from the British experience. Brereton even urged American commanders and other observers to travel to North Africa in the summer of 1942 to observe and participate for thirty days with parallel British organizations. American pilots had extensive technical training, but—at Brereton's orders—they nevertheless flew with British units upon their arrival in theater

⁷³ Marco Gioannini and Giulio Massobrio, "Bombardate L'Italia: Appendice on Line," Rizzoli, accessed December 16, 2014, <http://rcslibri.corriere.it/bombardatelitalia/>; Rust, *9th Air Force*, 11; Rein, *Air Campaign*, 47-48; Overy, *Air War*, 67; Cole, "Ninth Air Force," 60.

to gain familiarity with desert tactics, including five missions dedicated to desert navigation and fifteen missions devoted to learning to find targets in the open desert.⁷⁴

Another tactical improvement was the integration of intelligence analysis products into planning. For close air support missions, the intelligence required to plan effectively was simply an awareness of friendly forces' location and intentions. Tedder maintained that more effective close air support "depended upon better control of land forces," which thus "depended upon better communications, training, and recognition methods."⁷⁵ While direct support of ground forces was a staple of air doctrine, effective implementation relied on a near-real-time ability to collect and disseminate accurate friendly force information. Before the summer of 1942, ground headquarters' lack of knowledge of the location of their own forces often stymied air efforts to support them. Unable to pinpoint the location of friendly units, headquarters often delayed or cancelled direct support air missions, wasting valuable air support sorties. In the months leading up to the El Alamein offensive, however, Montgomery instituted an operations room in the Eighth Army advanced headquarters. Tedder noticed the parallels with his air operations room. "It was the first sign I had seen of [the ground forces] being able to collect and sift information about their battle," Tedder wrote, "and consequently the first sign I had seen of their being able to control it."⁷⁶ Again, the air support control centers also aided this effort. The direct communication links between air and land staffs at every echelon provided near-real-time intelligence about friendly and enemy positions necessary for the air headquarters to make timely decisions about resource allocation. Air support control processes evolved and efficiency improved throughout the campaign. Both air and land headquarters therefore improved their ability to integrate intelligence reports into their operational planning. This enabled coherent

⁷⁴ Cole, "Ninth Air Force," 18-19, 23, 95; Bickers, *Desert Air War*, 99.

⁷⁵ Tedder, *With Prejudice*, 203-06.

⁷⁶ *Ibid.*, 355.

integrated planning, improved the timeliness of responses to changes on the battlefield, and allowed air and land efforts to complement each other.⁷⁷

While the American bombers expanded Allied reach and tactical improvements enhanced direct air support capabilities, a systems targeting approach was the key to success in the fall of 1942. To some extent, this approach contradicted the contemporary understanding of air warfare. The ideas of Henri de Jomini and Carl von Clausewitz played a major role in the professional education of western military officers before the Second World War.⁷⁸ Jomini emphasized the principle of mass. He wrote that planners should “throw by strategic movements the mass of an army, successively, upon the decisive points of a theater of war.”⁷⁹ Clausewitz referred to the “center of gravity, the hub of all power and movement, on which everything depends.”⁸⁰ Army officers agreed on these fundamental principles, but diverged on their meaning. For traditional army thinkers, the enemy’s center of gravity consisted of its fielded forces. For air enthusiasts, on the other hand, the center of gravity was the enemy population’s morale. Within these groups, opinions further diverged. British air theorists advocated a direct approach to target morale, resulting in nighttime area bombing of population centers. The Americans, however, argued for an indirect approach. Their plan called for daylight, precision bombing of specific industrial targets. In the interwar years, the American Air Corps Tactical School taught its future Second World War generals that a systems analysis of the enemy dictated finding the one weakest link,

⁷⁷ Cole, “Ninth Air Force,” 25-26; Oral History Interview of Gen Lewis H. Brereton, 22 Aug 1942, typed transcript, Call #533.04, IRIS #00232278, in the USAF Collection, AFHRA, Maxwell AFB AL; Gladman, *Intelligence*, 114-15.

⁷⁸ Antulio J. Echevarria II, “American Operational Art, 1917-2008,” in *The Evolution of Operational Art: From Napoleon to the Present*, eds. John A. Olsen and Martin van Creveld (New York: Oxford University Press, 2011), 141-5.

⁷⁹ Baron Henri de Jomini, *The Art of War*, trans. G. H. Mendell and W. P. Craighill (n.p.: Project Gutenberg EBook, 2004), 70, accessed August 15, 2014, <http://www.gutenberg.org/files/13549/13549-h/13549-h.htm>.

⁸⁰ Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1989), 595.

which in turn inevitably meant massing bombers against specific industrial targets deep in the enemy's homeland. Collapsing those industries would in turn collapse the population's will to continue fighting.⁸¹

A modern understanding of systems leads to a different prescription for action. In open, dynamic, complex systems, causation is not necessarily proximate or proportionate. Analysis of a complex system, therefore, cannot definitively predict what impact a specific action will have. One effect may have multiple causes, and vice-versa.⁸² In this environment, "we can never do merely one thing."⁸³ Indeed, any action taken (or not taken) has multiple effects on the system. As a corollary, one must take multiple actions in order to achieve a single desired effect.⁸⁴ Air theorist John Boyd saw war as interactions between complex, adaptive systems. In 1986, Boyd wrote that strategy should "penetrate [the] adversary's moral-mental-physical being to dissolve his moral fiber, disorient his mental images, disrupt his operations, and overload his system." Commanders should therefore take action "to repeatedly and unexpectedly penetrate

⁸¹ Matheny, Michael R., *Carrying the War to the Enemy: American Operational Art to 1945* (Norman: University of Oklahoma Press, 2011), 114; Lieutenant General Carl A. Spaatz to General Dwight D. Eisenhower, *Thunderclap*, August 24, 1944, in Eisenhower's Pre-Presidential Papers, Principal File, Box 110, Dwight D. Eisenhower Presidential Library; Howard D. Belote, "Warden and the Air Corps Tactical School," *Airpower Journal* 13, no. 3 (Fall 1999): 39-42, accessed December 11, 2014, <http://search.proquest.com.lumen.cgscarl.com/docview/217778799>.

⁸² Neil E. Harrison, "Thinking About the World We Make," in *Complexity in World Politics: Concepts and Methods of a New Paradigm*, ed. Neil E. Harrison (Albany, NY: State University of New York Press, 2006), 11-12; Gharajedaghi, *Systems Thinking*, 49.

⁸³ Garrett Hardin, "The Cybernetics of Competition," *Perspectives in Biology and Medicine* 7 (Autumn 1963), 79-80, quoted in Robert Jervis, "Thinking Systemically about Geopolitics," *Geopolitics* 15, no 1 (2010): 165, accessed October 30, 2014, <http://lumen.cgscarl.com/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=poh&AN=48041992&site=eehost-live>.

⁸⁴ Robert Jervis, *System Effects: Complexity in Political and Social Life* (Princeton, N.J.: Princeton University Press, 1997), 291.

vulnerabilities and weaknesses exposed.”⁸⁵ Boyd advocated the need for multiple actions in order to constrain an opponent’s actions and ultimately defeat the system.⁸⁶ Similarly, John Warden argued, “to think correctly about war...it is necessary to think in system terms.”⁸⁷ He thought this systems analysis of an enemy would lead to the identification of multiple centers of gravity.⁸⁸ In 2000, Warden wrote that “especially against a modern, highly resilient industrial power, there may be no single key; thus, attacking a number of targets may be necessary.”⁸⁹ Whether by design or out of necessity, Coningham’s systems approach to targeting was ahead of its time.

Allied efforts in the summer and fall of 1942 displayed a sophisticated understanding of the enemy’s system in North Africa. Rather than narrowing air attacks to a single point—one specific industry or port, for example—Coningham directed strikes on targets throughout the system. Rather than insisting that air assets focus exclusively on close air support, Montgomery embraced the multi-faceted operational approach. The British established an inter-service committee to advise the Middle East Command on the best way to strike the Axis supply system. The committee relied on advice from its members, like supply expert British Major Enoch Powell, and intelligence from high-level communications, intercepted and decoded by the Allies. Coningham remained flexible and adjusted the air tactics based on the intelligence received from higher headquarters and his own forces regarding enemy actions, friendly positions, and the dynamic strategic context. Throughout July and August 1942, American bombers, aided by

⁸⁵ John Boyd, “Patterns of Conflict,” (unpublished brief): 141, accessed August 16, 2014, <http://dnipogo.org/john-r-boyd/>.

⁸⁶ Frans P. B. Osinga, *Science, Strategy and War: The Strategic Theory of John Boyd* (New York: Routledge, 2007), 117.

⁸⁷ John A. Warden, “Centers of Gravity in Joint Planning” (draft paper, December 2014), 3.

⁸⁸ John A. Warden, e-mail message to author, August 6, 2014.

⁸⁹ Col John A. Warden, *The Air Campaign: Planning for Combat* (San Jose, CA: toExcel Press, 2000), 9.

intelligence from decoded messages, struck ships, ports, airfields, troop concentrations, and ground supply convoys. While no single attack was decisive, over time, the enemy system weakened. On August 10, 1942, Brereton reported that the Libyan ports of Benghazi and Tobruk, and the Egyptian port of Matruh were operating at 60 percent of their potential capacity. By the end of August, the Axis loss rate of southbound shipping to North African ports reached 50 percent. These air efforts to disrupt Rommel's supplies pressured him to rush the attack at Alam Halfa as his resources dwindled. At the same time, Montgomery's use of military deception to entice Rommel to attempt a resource-intensive envelopment at Alam Halfa constrained his later choices by further depleting his fuel reserves. Axis forces wasted crucial fuel trying to exploit a flank that only looked weak.⁹⁰

Meanwhile, the bombardment continued into the fall. During the first two weeks of September 1942, Axis ships carrying 18,000 tons of material sunk with another 6,000 tons of material damaged. To minimize their naval convoy exposure, the Axis used ports that were closest to Italy, requiring the shortest route across the Mediterranean Sea. However, this meant long, exposed over-land routes—the port of Tobruk was 350 miles from El Alamein—after loading the supplies onto trucks. Since Allied forces on Malta could strike Tobruk directly, the Axis shifted their shipping to the ports of Benghazi and Tripoli (800 and 1,300 miles from the front lines, respectively). They used as much as 30 to 50 percent of all the fuel that arrived in North Africa simply to drive supplies between Tripoli and the front. These ground convoys along the narrow coastal road were also vulnerable to air attacks. Coningham's air force took advantage of the restrictive terrain and relentlessly pummeled the ground supply routes in the summer and

⁹⁰ Levine, *Rommel's Supply Lines*, 10-11; Gladman, *Intelligence*, 42-45; Rust, *9th Air Force*, 14; Cole, "Ninth Air Force," 31.

fall of 1942. Allied forces thus arranged their tactics to combat the enemy system at multiple points, in multiple ways, to achieve a position of advantage on the El Alamein line.⁹¹

By the middle of October, the difference in supplies between the forces reached a tipping point. The ratio of Allied to Axis soldiers was 1.76 to 1, the ratio of guns was 1.57 to 1, and the ratio of tanks was 2.05 to 1, due in no small part to a shortage of parts that did not survive the supply line gauntlet. In their efforts to affect the enemy's supply chain, however, Coningham and Montgomery did not neglect the importance of air defense or close air support for the Eighth Army. Coningham directed attacks on airfields and air forces to degrade Rommel's ability to attack. By the start of the Battle of El Alamein, the Axis had just 713 planes—many in various states of disrepair—compared to 1,263 planes in the Allies' inventory. Relentless air strikes in the summer and fall of 1942 gave Coningham the numerical superiority that allowed him to dedicate fewer planes to defensive counter-air during the battle. This left more assets available for close air support and battlefield interdiction during El Alamein. In short, American bombers extended the Allies' reach, enabling them to create effects well beyond the front lines while evolutions in tactics improved close air support effectiveness. Armed with these tools, and by acting on the enemy system in multiple ways, the Allies weakened the Axis supply system, constrained Rommel's options, and set the conditions for success at El Alamein.⁹²

⁹¹ Cole, "Ninth Air Force," 40-41; "AAF in the Middle East," 7; Hammond, *El Alamein*, 118-19; Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, 2nd ed. (Cambridge: Cambridge University, 2004), 190; Gladman, *Intelligence*, 108-109.

⁹² Cole, "Ninth Air Force," 52; Tedder, *With Prejudice*, 358; Brereton, *Brereton Diaries*, 160; Gladman, *Intelligence*, 115.

Conclusion

Throughout the Western Desert Campaign, Allied leaders made great strides in improving joint and coalition warfare in terms of command relationships, basing, and resource allocation. First, Coningham and Montgomery used co-located headquarters and liaison officers to ensure a shared joint vision and unity of effort, if not unity of command. Next, the “leapfrog” aerodrome support technique allowed basing flexibility and enhanced offensive reach. Finally, Coningham and Brereton optimized their limited resources, using American bombers, improved direct support tactics, and a systems analysis of Rommel’s forces to shock and overwhelm the enemy.

Despite the joint and coalition successes in the Western Desert Campaign, two major failures surfaced. First, both Montgomery’s slow pursuit of Rommel after El Alamein and the lack of integration between the Torch and Western Desert operations resulted in missed opportunities for the Allies. Second, and even more bewildering, was the failure of subsequent operations to build on the lessons of the British and American joint forces in El Alamein. In terms of command relationships, for example, Allied Force Headquarters issued a directive in preparation for Operation Torch that gave the task force commander authority to allot air forces directly to subordinate units. In other words, in contrast to the combat-proven methods of centralized control already in practice in Egypt, relatively small army units would command their own air assets during Torch. In addition, the American commanders for Operation Torch did not use the co-located headquarters and extensive liaison officer techniques that contributed to successful British joint efforts. Finally, the Allies failed to learn from the resource allocation and targeting lessons of the Western Desert Campaign. For example, Brereton wrote a report detailing the British tactics and procedures for desert air warfare that reached US Army Air Force leaders two full months before Torch, in time to train the new units before their arrival in theater. Incoming units, however, failed to replicate the improvements the British made in targeting and

direct support tactics.⁹³ According to historian Vincent Orange, “Failures in the transmission of information from the desert back to Britain and on to the United States are typical of an ancient theme in military history: *the reluctance of tribes, nations, and armed forces to learn except from their own experience* [italics in original].”⁹⁴ Already the lessons of Egypt—regarding command relationships, supply, maintenance, communications, tactics, and mobility—had been lost or forgotten.

Throughout the rest of the fighting in Africa and for the duration of the Second World War, Allied leaders continued to struggle with one of the most important lessons of the Western Desert Campaign: the tension between allocating limited air assets toward a single set of “strategic” targets or in direct support of ground forces. Throughout the war and beyond, air proponents continued to oversell strategic bombing effects, claiming bombing alone could end every conflict quickly and cheaply.⁹⁵ Army commanders, on the other hand, continued to advocate divvying up air assets as they would artillery, in direct support of tactical ground units. In the Western Desert Campaign, Coningham and Montgomery rejected this false choice. They centrally controlled air forces and used all of their assets effectively—bombers, fighter planes, artillery, land force maneuver, and deception—to attack multiple points in the enemy system and first cripple, then defeat the Axis forces. Today’s military can also benefit from the joint and coalition warfare methods the Allies developed in North Africa—in terms of command relationships, basing, and effectively allocating resources to affect the enemy as a system.

The implications for current military operations are clear. First, US doctrine has settled one part of the command relationships puzzle by establishing a joint forces commander who controls the actions of the various services and coalition partners in the land, air, and maritime

⁹³ Mortenson, *Joint Operations*, 51; Overy, *Air War*, 68; Rein, *Air Campaign*, 53-54.

⁹⁴ Orange, “Getting Together,” 11.

⁹⁵ Colin S. Gray, *Airpower for Strategic Effect* (Maxwell AFB, AL: Air University Press, 2012), 34-35.

domains. To achieve success, however, these organizations must be able to work together at every level, not just on the level of the joint forces commander's staff. Improvements in technology may have reduced the requirement for physically co-locating headquarters buildings at every echelon, but subordinate commanders and staffs still need continuous communication, strong relationships, and trust between the different services and coalition members in order to reach and accomplish a shared vision. As Coningham demonstrated, co-located headquarters and liaison officers throughout the organizations may still be the most effective method to achieve this level of integration.

Second, while the United States has recently experienced a long period of uncontested air operations and basing, it cannot expect to operate in permissive environments indefinitely. If future adversaries deny American air forces access to the battlefield, planners would be wise to remember the concepts that extended Coningham's reach. Splitting operations between two bases is anathema to US air forces, but in certain situations, the "leapfrog" model could help enhance fixed- and rotary-wing aircraft range and flexibility, while preserving airfield security. At the same time, planners should learn from the Allied mistakes in Africa: integrating operations across an entire theater (or multiple theaters) allows planners to leverage capabilities. Properly integrating effects across the land, sea, air, and space domains can mitigate the limitations that a lack of secure basing might cause.

Finally, today's military should emulate the way the Allies allocated their resources in North Africa. Rather than focusing exclusively on a single perceived decisive node or parceling air support to ground commanders at the lowest echelons, planners should attack the enemy as a system. Now, the availability of off-the-shelf technology has narrowed the gap between American military capabilities and those of its enemies. In an era of reduced military spending, the United States cannot count on an ability to mass resources and "win" with brute force alone. Like the Allied forces in North Africa, America may again find itself under-resourced in a fight against a near-peer competitor. Success will lie in effectively using every available tool to understand the

situation and then act in multiple ways to shock the enemy's system—out-thinking the adversary when out-numbering and out-spending is impossible.

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