Intelligence and Anglo/American Close Air Support in the Western Desert and Tunisia, 1940-1943

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Abstract

This dissertation examines the role of intelligence in the application of close air support by both the Royal Air Force (RAF) and United States Army Air Force (USAAF) during the campaigns in the Western Desert and Tunisia during the Second World War. It was in this theatre that the foundations for the organization, control, and direction of close air support for the remainder of the war were laid. It was also the first instance of a combined Anglo/American ground campaign, and many of the problems and solutions first appeared there. More importantly, however, it was a theatre in which intelligence was fundamentally important to both ground and air operations.

This dissertation begins with an examination of the interwar doctrines of both the RAF and USAAF, and argues that while neither air force had an evolved close air support doctrine, each possessed a theoretical understanding of the subject and had officers capable of creating a doctrine when the time came. The remaining chapters are chronological, and show how with improved command, control, communication, and intelligence systems, aircrew ability, and the right kind of aircraft, the ability of the RAF and later the Northwest African Tactical Air Force to provide close air support improved dramatically. The dissertation concludes by arguing that both the RAF and USAAF adopted the doctrine evolved in the desert, and this system, which relied heavily on intelligence for its success, continued to govern the control of tactical air power for the rest of the war and beyond.
Table of Contents

Title Page........................................................................................................................................1
Abstract........................................................................................................................................2
Table of Contents.......................................................................................................................3
Introduction................................................................................................................................4-44
Chapter 1: The Fall and Rise of Close Air Support Doctrine.................................45-91
Chapter 2: Close Air Support from 'Compass' to 'Crusader'..............................92-155
Chapter 3: Close Air Support from Gazala to the El Alamein Line..............156-201
Chapter 4: Alam Halfa and El Alamein.................................................................202-238
Chapter 5: Close Air Support During the Pursuit from El Alamein to Tunisia.........................................................239-263
Chapter 6: Close Air Support During Operation 'Torch'.................................264-302
Chapter 7: Close Air Support After the Reorganization of February 1943.................................303-353
Conclusions.............................................................................................................................354-379
Abbreviations Used...............................................................................................................380-382
Bibliography..........................................................................................................................383-397
Introduction

The Western Desert has been aptly described as a tactician's paradise but a quartermaster's hell. Fighting in the desert imposed certain requirements on armed forces engaged there. The seemingly endless desert of sand, dust storms, rock and salt marshes was hard on men and machines alike, and provided none of the resources armies needed to fight or merely survive. The low force-to-space ratios allowed for brilliant mobile operations, but this tactical freedom came at a heavy price. Difficulties in supplying armed forces under such conditions were exacerbated by high consumption rates during mobile operations, where deficiencies in supply were keenly felt. Military operations thus had to be cost-effective, as neither side could afford to waste resources. Areas of Tunisia, by contrast, were mountainous and the force to space ratios were much higher, although there were areas where mobile operations were possible. In either case, intelligence had the potential to increase dramatically the cost-effectiveness of operations, but the highly fluid battles in the Western Desert and parts of Tunisia made acquiring accurate intelligence in real-time difficult. In the mountainous regions of the rest of Tunisia, geographical considerations posed different challenges to intelligence use. In both cases, an efficient system of command, control, and communications was required to make use of intelligence. The studies dealing with these campaigns have missed this important
aspect, and thus fundamentally misunderstand how close air support functioned and its requirements for success.

The literature dealing with the air war in the West is heavily slanted towards the strategic bombing campaign against Germany. This trend is not surprising given the moral enormity of the strategic air offensive. The Allied powers have held the moral high ground for the Second World War against Nazi Germany and Japan, yet this stands in contrast to the destruction visited on these two nations by those professing to have been fighting 'the good fight'.

There are many general works on the air war that include the Western Desert and Tunisian campaigns, but they offer little in the way of a thorough understanding of how close air support functioned and the role of intelligence in its success. John Terraine's work illuminates some of the important aspects of air power in the desert and Tunisia. Richard Overy's book is one of the few that even mentions intelligence, but the scope of the work does not allow the author to pursue the issue. The RAF's official history, written by Denis Richards and Hilary St. George Saunders, goes into some detail about the day-to-day operations of the RAF and later the Northwest Africa Tactical Air Force. It offers insights

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4 Denis Richards and Hilary St. G. Saunders, Royal Air Force, 1939-1945, Vols. I and II,
into what was required for successful tactical air operations, but
neglects the important issue of intelligence. The official history of the
USAAF, written by Wesley F. Craven and James Lea Cate, offers a good
narrative of the Tunisian campaign, but generally gives little notice to
close air support.®

The literature dealing specifically with close air support during the
campaigns in the Western Desert and Tunisia is missing vital aspects of
how it functioned. Indeed, the only work that deals in any depth with the
development of a system for the delivery of close air support during the
campaigns in the Western Desert is a 1955 Air Historical Branch
monograph.® Most other works focus on the Tunisian campaign, while
tending to discount the difference between the methods of air support
practiced in Britain compared with that in the desert. The most relevant
studies in addition to the Air Historical Branch monograph are works by
Richard Hallion, Benjamin F. Cooling, Williamson Murray and Allan Millett,
and Daniel Mortensen.⁷

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⁵ Wesley Craven and James Cate, The Army Air Forces in World War Two, (Chicago: University of
⁷ Richard Hallion, Strike from the Sky: The History of Battlefield Air Attack 1911-1945,
(Shrewsbury: Airlife Publishing Ltd., 1989), Richard Hallion, "Battlefield Air Support - A
Williamson Murray and Allan R. Millett, Military Innovation in the Interwar Period, (Cambridge
University Press, 1996), Daniel Mortensen, A Pattern For Joint Operations, (Washington: Office of
Air Force History), and Daniel Mortensen, Air Power and Ground Armies, (Air University Press,
1998).
In addition to these titles are articles by Air Marshal Coningham, and a later work by Lt. Col. Carrington. Both of these articles are autobiographical, with each author describing his role in the evolution of close air support – Coningham as the progenitor of the doctrine, and Carrington as an Air Liaison Officer. They provide useful background information, but little else. A more recent article by W.A. Jacobs, a professional historian, goes into more detail about Army Cooperation Command, Fighter Command, and the struggle over which formation would provide air support during a cross-channel invasion of Europe. This theme is studied in more detail in David Hall’s D. Phil. thesis.

Richard Hallion’s book presents itself as a comprehensive study beginning essentially with the advent of aircraft through to the end of the Second World War. The most obvious problem with this work is the enormous period of time covered in such a short space. No study can claim to cover the entire history of air attack in all countries to the end of the Second World War in one volume, except in the most cursory fashion. Although Hallion succeeds in illustrating the major developments in close air support aviation, his effort comes up short in a number of areas. He discusses the experience of the First World War, and how both the RAF and USAAF forces had some experience with a workable doctrine for

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close air support. He shows how the preoccupation with strategic bombing doctrine resulted in the loss of this ability in both forces, and he describes some of the efforts of the RAF in the interwar period to use close air support in its air control operations. However, he fails to explore the level of interest shown by certain officers in both air forces that proved important when the time came to develop a doctrine for close air support. Hallion does attempt to reconstruct the air support system, but the system he describes is drawn from doctrinal manuals without reference to the considerable changes made to the system in the Western Desert and Tunisia. Moreover, there is no mention of how intelligence was used to track enemy movements, to locate targets, and to assess damage inflicted – an important element in many air control operations. Hallion covers the campaign in the Western Desert from the beginning through to the battle of El Alamein in twelve pages, and the rest of the Tunisian campaign in another nine. It is clear that the author understands some of the requirements of an air support system, but he cannot analyse it in the space provided.

Cooling’s book includes a chapter on the Tunisian campaign. This chapter, written by David Syrett, deals with an essential issue of how the doctrine for close air support developed in the desert was brought to Tunisia by Air Chief Marshal, later Marshal of the Royal Air Force, Sir Arthur Tedder, Air Marshal Arthur Coningham, and some staff transferred
from the Western Desert Air Force (WDAF). He argues quite correctly that control of tactical air resources under a senior air force officer was essential to the success of close air support. However, the reader is left without an adequate understanding of the importance of intelligence to this system, and what was required to make intelligence useful to military commanders. In the absence of intelligence, commanders were unable to focus their air strength at the most appropriate target to the detriment of overall efficiency, but with a streamlined command structure and effective communications, commanders could receive and respond quickly to intelligence. Indeed, when the system for the control of tactical air forces was fully developed, requests for close air support were similar to pieces of raw intelligence. They had to be assessed for importance and related to other similar requests and to Allied air strength. Once this had been accomplished, reasoned orders could be issued to use that air strength effectively.

A weakness in Syrett’s argument involves his assertion that Coningham focused his aircraft away from close air support in favour of interdiction targets behind the front lines. To back up his argument he refers to weekly intelligence reports from the Northwest African Air Force that gave a breakdown of the major bombing efforts. Syrett argues that only four of the twenty-eight major bombing missions attacked targets of opportunity and enemy troop concentrations. It is true that close air

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support operations were less frequent than other more continuous uses of tactical air power, but as one of these intelligence reports claims, the entire story, however, of the weight of our air efforts is not told by bombed enemy installations alone...planes of the NATAF on fighter sweeps disrupted supply lines, straffed and destroyed numerous enemy vehicles and played an important part in the “softening up” of enemy ground defenses thereby aiding our Ground forces in their advance.¹²

Much of the bombing effort described in the intelligence reports was designed, as part of the overall air plan, to divert the Axis air forces away from the Eighth Army so that the WDAF could focus completely on close air support operations. By failing to appreciate the purpose of the reorganization of the air forces, Syrett is missing a major theme regarding the employment of tactical air power. Air commanders were perfectly willing to accommodate requests for air support, but when such support was not required, focused their air effort against other targets. Because other targets received more air effort did not mean that close air support was ignored. Indeed, Syrett then describes the use of close air support during the final assault on Tunis as being important to its success. A “number of these sorties were directed against the Madjerda Valley in front of the attacking British First Army, where in an area 1,000 yards deep and 4 miles long Allied aircraft literally pounded them into

¹² National Archives and Record Administration (NARA), College Park Maryland, Record Group (RG) 165 P-File, Box 58, Weekly Intelligence Summary No.21, 12 April 1943.
Such committed close air support does not hold with his assertion that it was ignored in favour of other operations.

Daniel Mortensen's book *Air Power and Ground Armies* contains two particularly relevant articles. The first, "Getting Together" by Vincent Orange, who has written biographies of Air Marshal Coningham and Air Chief Marshal Sir Kenneth Cross, deals with the failure of airpower during 'Torch' and how Tedder and Coningham aided the formation of an effective Allied air force. It provides insights into the relative ease with which this was accomplished, when it was proving difficult for British and American ground commanders to cooperate. Professor Orange correctly accords Tedder and Coningham much of the credit for the success of the reorganization of air forces, but does not discuss the role played by General Spaatz. The author also shows the impact of the Desert Air Force's close air support doctrine in Britain and the United States, but fails to explain that doctrine sufficiently. This article is useful in showing aspects of close air support, but does little to show how the system worked, what it required to be effective, or its effect.

The second relevant article in this collection is "A Glider in the Propwash of the Royal Air Force?", written by David Mets. It is devoted to a discussion of what instigated the reorganization of armed forces in Tunisia, and exactly what the RAF taught the USAAF in terms of close air

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13 Syrett, p.183.
support. Mets argues that the failure of American ground and air
forces during the Kasserine battles has been used as the explanation for
the reorganization. He argues convincingly that the organization was well
underway before this offensive, and that the timing of the two has given
rise to this misunderstanding. However, there are serious problems with
his argument as to the state of USAAF tactical air doctrine, as will
become evident later.

The Air Historical Branch of the British Air Ministry produced a
narrative, entitled Air Support, which is a concise summary of the major
changes in the evolution of air support systems of the RAF, beginning
with the experience of the First World War. The study glosses over the
loss of this experience to the preoccupation with strategic bombing during
the inter-war years, leaving the reader to wonder why the RAF was
unable to conduct air support operations in Norway and France in 1940.
Again there is no mention of intelligence, although this is understandable
considering the sensitive nature of such things in 1955 when the
narrative was written, and no real understanding of the importance of
streamlined command structures and flexible communication systems in
the process. Having said this, the book is very useful in piecing together
the evolution of the air support control system for the RAF and Allied air
forces.

Ian Gooderson’s Ph.D. dissertation, later published as a book,
attempts to gauge the efficiency of the air support system in Italy and
Northwest Europe, although the study is somewhat deficient in explaining what made the system function at all. A particularly troubling aspect of Gooderson’s work is his acknowledgement on the one hand that close air support was a requirement to victory in many battles such as Mortain in 1944, but on the other hand was an unnecessary diversion of effort away from the more important bomber offensive and deep interdiction. However, if close air support was necessary and valuable at certain points then the effort put into developing the system to apply it was not wasted. Furthermore, the effort put into making command structures streamlined, communications efficient, and intelligence analysis accurate and swift, aided deep interdiction and bombing efforts. By controlling aircraft under commanders who had access to all the available intelligence, the best available targets could be attacked.

Another main theme of this dissertation is the interwar tactical air doctrine of both the RAF and USAAF, a subject dealt with in the first chapter. This chapter will show, in contrast to the existing historiography, that while both air forces focused their official doctrine on strategic bombing, there was an undercurrent of writing about close air support, and in the case of the RAF actual combat experience. This did not constitute a complete doctrine, but it did mean that when the time came to develop one, there were individuals with the requisite experience to enable it to function. Richard Hallion describes the RAF’s Air Control

exercises and other small wars on the frontier of the Empire, but he
discourts the value of this experience. By doing so, he misses the fact
that even the small amount of experience with close air support offered
during these wars was crucial for those who worked out the system in
1940-45. Indeed, John Slessor’s memoir and his papers at the Public
Record Office show that intelligence played a significant part in the
operation of the system, and that officers like Tedder and Coningham
received reports about and had experience in these operations.15

Richard Muller’s chapter in Murray and Millett’s book deals with the
interwar doctrine of the United States, Britain, and Germany. It correctly
argues that the RAF and USAAF focused on strategic bombing at the
expense of tactical air power. But it incorrectly rejects the air control
experience as being of little value to the development of RAF tactical
document, and wrongly argues that the RAF’s process of innovation came
after the battle of France. Elements of this argument are certainly true,
but the overall argument does not hold with the speed with which the
RAF were able to create a system for the delivery of support; a system
which made use of many of the principles used routinely in small wars on
the frontier.

Reflecting the trend in the literature, most studies of RAF and
USAAF interwar doctrine focus mainly on the strategic bombing issue.
These include works by H. Montgomery Hyde, Malcolm Smith, Scot

Robertson, D.E. Johnson, and Williamson Murray. There are no serious studies dealing with RAF interwar tactical doctrine beyond those discussed, but there are more in the literature relating to the USAAF.

The first of these are works by Thomas Greer and J. Heither which describe the fate of both attack and pursuit aviation during the interwar period, and show how other uses for air power were gradually moved aside in favour of strategic bombing doctrine. Thus, although the USAAF was a branch of the army, in many ways it was as weak as the RAF in close air support doctrine. An aspect missing from both works was the move in 1941 by the USAAF’s chief General H. Arnold to try and establish a workable doctrine for close air support, in response to lessons learned during the initial British failures in Norway and France to defeat German armies aided by air support aircraft. The USAAF conducted tests in 1941 to try and work out the practicalities of providing support. The results of these tests are briefly covered in Kent R. Greenfield’s work. The USAAF borrowed copies of British developments on close support doctrine developed after the failures in France, and incorporated elements

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of them into their doctrine. The result was a system as unsuited to the
task as that which the RAF brought to Tunisia. However, as this
dissertation will show, there were certain officers who had the requisite
experience and ability to adapt successful elements in the WDAF’s
document to their own. This was a testament both to the ability of these
individuals and the USAAF’s flexibility.

David Mets’ article “A Glider in the Propwash of the RAF?” is not
convincing when it argues that the USAAF understood and indeed
developed many of the ideas that made up the doctrine for close air
support as practiced in the Western Desert, and that the RAF only
provided a theatre indoctrination for the USAAF. He is partially correct in
saying that the Air Corps Tactical School (ACTS) devoted some time to
close air support, but another work by T. H. Hughes shows that such
courses accounted for one-fortieth of the final mark and were downplayed
by ACTS instructors.¹⁹ Even if one accepts Mets’ argument,
understanding a theory was very different from putting it into practice on
the battlefield.

The failure to define the term ‘doctrine’ is another weakness in
Mets’ argument. This issue will be dealt with in the opening chapter of
this dissertation, which will show that what Tedder and Coningham
brought to Tunisia was a doctrine largely foreign to the rest of the RAF.

¹⁹ Hughes, T.H. Overlord: General Pete Quesada and the Triumph of Tactical Air Power in World
Thus, both the USAAF and the rest of the RAF were inducted into a new way of conducting operations, one that incorporated intelligence into operations as never before. Moreover, the practicalities of intelligence and operational staff work were brought to Tunisia by officers transferred from the WDAF, as was a totally new way of looking at tactical air power. Other works on interwar doctrine suffer from an inadequate definition of the topic.

Daniel Mortensen argues in his book *A Pattern for Joint Operations: World War II Close Air Support North Africa* that the USAAF believed air support was its chief aim during the interwar period. Again, the official texts from the ACTS are used to support this argument, although a more critical reading of these sources shows the lack of emphasis on this application of air power. This dissertation will argue that the only serious attempt to understand how close air support worked came through the Command and General Staff School, which was attended by many of those who were responsible for re-designing American doctrine after Tunisia. Mortensen’s section on Torch and Tunisia is quite brief, and only highlights certain problems of the development of effective close air support. He emphasizes, for example, the lack of preparation for a serious campaign, as well as a lack of reliable signal communication that plagued the USAAF throughout the campaign. He gives little insight into the close air support system which the USAAF brought with them, how at first it failed to work, and how it fitted into the Allied system developed
by Coningham with assistance from Tedder. He also stresses, as do other authors, the low priority which seemed to be accorded to close air support in favour of air-to-air and interdiction operations. As has already been pointed out, Coningham was willing and able to provide overwhelming close air support when required, but the interdiction and air-to-air operations were continual operations that by their very nature seemed to be receiving greater attention. Indeed, Luftwaffe doctrine stressed the importance of obtaining air superiority before close air support operations could be effectively conducted; yet their air force was always closely linked to army operations.\(^\text{20}\)

Another attempt to come to terms with the place of the USAAF’s tactical air doctrine is Lee Kennet’s chapter in Cooling’s book.\(^\text{21}\) Although this chapter is supposed to concern developments in many countries, it is heavily slanted towards the USAAF. He shows the slow decline of attack aviation, which had initially been championed by Billy Mitchell, and of pursuit aviation in favour of strategic bombing. He gives some idea about General Arnold being the driving force behind a resurgence of attack aviation following the British failures against Germany, but the chapter is simply too short to deal effectively with the issues. Thus, this

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dissertation will make a significant contribution to the existing
historiography on both RAF and USAAF interwar tactical air doctrine.

The other major theme of this dissertation deals with command,
control, communication, and intelligence (commonly termed C^3^I)
arrangements from the beginning of the war in the desert to the end of
the Tunisian campaign in May 1943. Looking at close air support from
the standpoint of C^3^I is a new approach. The best source dealing with C^3^I
theory is Michael I. Handel’s general introduction to Intelligence and
Military Operations. 22 An article by John Ferris entitled ‘The British Army,
Signals and Security’ in this book, and another of Ferris’ articles,
“Airbandit: C^3^I and Strategic Air Defence during the First Battle of Britain,
1915-18,” provide further theoretical background to C^3^I. 23 There is,
however, no study that deals with the importance of C^3^I to the
employment of close air support, and this dissertation will also provide a
contribution to this area of the historiography.

Depending on which source of intelligence one is referring to, there
has been either a great deal or little to nothing written about it. F.H.
Hinsley’s work is indispensable for the sections on intelligence, but as
with many such studies, it cannot handle adequately all the elements it
encompasses. 24 Concerning Ultra, Ralph Bennett and Gordon Welchman’s

23 Michael Dockrill and David French, (eds.), Strategy and Intelligence: British Policy During the
1979).
works are by far the best for this one aspect of intelligence. This dissertation will contribute to intelligence historiography by showing how strategic intelligence guided operational intelligence gathering efforts, and how intelligence aided all aspects of close air support.

Only two sources deal with the important ‘Y’ source in the desert and Tunisia. Aileen Clayton’s work is the best source for RAF ‘Y’ in the Mediterranean, and Hugh Skillen’s book provides some details about Army ‘Y’ in the desert and Tunisia. The latter work shows how dependent the US forces were on the more experienced British ‘Y’ personnel in Tunisia, and how ‘Y’ was often the most important source for determining enemy movements. This dissertation will show how ‘Y’ was exploited, first in the desert and later in the Tunisian campaign, to reconstruct the enemy order of battle, and to provide tactical intelligence to pilots engaged in close air support operations.

Raymond Toliver’s work is an important source for understanding the requirements for effectively exploiting prisoner of war interrogation. Toliver is able, through a combination of stories from Hans Scarff, a very successful Luftwaffe interrogator, and his own narrative to show the methods found to be most useful in extracting intelligence from even the most resistant prisoners, and how even casual comments by prisoners

were used to gain valuable intelligence from others. Toliver’s book, although it does little to address the role of prisoner of war intelligence to close air support or the Mediterranean theatre, provides an understanding of the importance and requirements of this source. A recent article by Kent Fedorowich deals with similar issues from the British perspective.

Photographic and visual reconnaissance, both used to locate targets and assess damage inflicted, have had few good histories written about them. There are several for the RAF, including works by Peter Mead and a book written by the Association of Royal Air Force Photographic Officers covering the changing organisation, equipment, and procedures of RAF photo-reconnaissance through the war. An older work by Constance Smith covers many of the changes to photographic reconnaissance during the Tunisian campaign, but gives no clues as to the importance of this intelligence source to close air support. The same is true of the more recent work by Edward Leaf, and Chris Staerck’s work, written in 1998, which ignores the North African campaigns altogether.

The best source on the USAAF’s contribution to reconnaissance intelligence in the Tunisian campaign is R.F. Futrell’s book. Futrell gives

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32 Robert F. Futrell, Command of Observation Aviation: A Study in Control of Tactical Air Power,
a good account of the weaknesses of American reconnaissance efforts, as well as of the efforts by senior American air officers to overcome them. He argues that at the beginning of the Tunisian campaign, the photographic units attached to Eastern Air Command RAF and the USAAF's 3rd Photographic Group duplicated each other's efforts and the intelligence reports on the same material were usually conflicting. His account offers little to the understanding of the role of reconnaissance to the application of close air support, what it required to become effective, and how it participated in Allied planning. However, his work includes a narrative of how the USAAF changed its organization of reconnaissance aviation to a system virtually identical to that of the RAF. This illustrates not only that American officers learned the value of properly organized aerial reconnaissance, but also that they were very willing to find and apply new elements to their doctrine. Another of Futrell's articles reinforces this by showing that the USAAF, following the Tunisian campaign, reorganized its intelligence on the British model with few deviations. This is also evident in a book by Cooling and Lt. Col. John Hixson which shows how the US Armed Forces adopted British methods for the exploitation of signals intelligence, captured enemy documents, and photographic intelligence.
Taken as a whole, the literature dealing specifically with close air support is missing a fundamental aspect that this dissertation will begin to provide. It will show the effect of intelligence on close air support, what was required to make intelligence useful, and how the resulting combination affected the ground campaign as a whole. The importance of this is difficult to underestimate. Historians continue to argue about whether interdiction was more useful than close air support. This is really less of an issue than they allow. With access to good intelligence, the best target could be selected for attack. In an environment where air forces were equal in number, intelligence acted as a force-multiplier. When, as was often the case, Allied air forces outnumbered their enemy, it allowed for the best use of those forces in support of the ground campaign. This dissertation will do much to bridge the gap between operational and intelligence histories of the period. It will also show how intelligence allowed for faster response to a changing situation.

When faced with a changing situation on the battlefield, armies and air forces go through a four-staged loop known as the 'Boyd' or 'OODA' (Observe, Orient, Decide, Act) loop. This concept, developed by Colonel

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Boyd of the United States Air Force from his analysis of aerial combat in Korea, held that pilots (or armies) go through a series of four-staged loops leading to action against the enemy. The loop began with observation of both enemy and friendly forces, made easier by the better visibility provided by the F-86 bubble canopy and by intelligence in the case of armies or air forces. In the second stage, incoming intelligence was analysed in relation to the total situation, and related to the capabilities and intentions of enemy and friendly forces. In the third phase, a course of action was decided upon, followed by the fourth stage, the execution of that decision. How quickly armies or air forces went through this loop enabled them to respond quickly to a changing situation and taking advantage of fleeting opportunities, something common in North Africa. The side that was slower in reaching the action phase missed these opportunities, and frequently found that by the time they completed the loop, the action they decided upon was ineffective. Intelligence, properly and rapidly assessed and disseminated, allowed armed forces to go through the 'Boyd' loop more quickly and thus they could react more quickly to changes on the battlefield.

How long it took armies to go through the 'Boyd' loop depended upon the situation, and at what command level the decision to act was made. For example, responding to an anti-tank emplacement or other small-scale obstacle in the path of an infantry or armoured formation did not require a major command decision. Indeed, the doctrine imparted to
the troops usually included means for dealing with such things, and the execution was more or less automatic. The unexpected presence of an armoured division in the path of an offensive, on the other hand, required a major reconsideration of the line of advance for the lead elements, and the 'Boyd' loop began with the intelligence being relayed up the chain of command. Whether the information was accurate and relayed to commanders in real-time influenced whether the responding action was appropriate or not. Paradoxically, the ability to make the appropriate decision in a rapidly changing environment depended upon having access to all available intelligence which only occurred at the higher command levels, and the process of making sense of all available intelligence and then transmitting orders took more time the higher up the chain it had to go before a decision was made. Only efficient C^3I lessened these problems.

The British forces in the desert attempted to adopt a system of command similar to that employed by the German forces; one which relied on verbal orders and gave subordinates more initiative than was typical of the British army. Verbal orders were common during 'Compass' and 'Crusader', and had become the norm by the time of the Axis Gazala offensive in mid-1942. Air Marshal Coningham instituted a similar change to the RAF in 1941. One of his Wing Commanders later recalled that "except in exceptional circumstances, his instructions to me as OC 258 Wing would be in the form of general directives, often verbal, and that all
detailed orders to the squadrons would be my responsibility."\textsuperscript{36}

Coningham later brought this command style to the Northwest African Tactical Air Force in February 1943.

This style of command differed from official British army doctrine as reflected in the Field Service Regulations. The last version before the war was written in 1935. In these regulations, battles were to be planned in meticulous detail, and little deviation was tolerated. According to the Field Service Regulations, operational command in the field was exercised by operation orders, and when necessary operation instructions. Orders were to be issued in writing, and would contain “the actual method of attaining the object...in sufficient detail to ensure co-ordination of effort.”\textsuperscript{37} Operation instructions were used when subordinate commanders had to be trusted to follow their own judgment, but were to be used sparingly.\textsuperscript{38} Subordinate commanders were to be “left freedom of action in all matters which they [could] or should arrange for themselves”, but this was a marked difference from the German style of command, or indeed, from the style that developed in the Western Desert.\textsuperscript{39}

The American style of command was different to that of the British Field Service Regulations, and was similar to that developed by the Eighth army. Both armies allowed more initiative from subordinate commanders.


\textsuperscript{38} Ibid., p.27.

\textsuperscript{39} Ibid., p.28.
For example, during the Tunisian campaign, General Patton's II Corps was to take the Maknassy heights in concert with an advance by Eighth Army from the Mareth position. General Patton issued an order to the commander of the First Armoured Division, Major General Ward, to take and hold this position, but left it to him to decide how to accomplish the mission. When Ward failed to take the Maknassy heights, Patton "soon began to push Ward with a passion that verged on obsession." However, despite the constant pressure from Patton, Ward was allowed to conduct the battle as he saw fit. In the context of good C³I, this style of command was suited to the desert environment, and enabled commanders to make the best use of close air support. The Germans noted that "Air/ground cooperation, which was not good at the beginning of the campaign, had improved noticeably by the end."  

With reference to close air support, the length of time it took to go through the 'Boyd' loop depended upon whether one was referring to pre-arranged or impromptu support. In the former case, the air support was dependent upon the soundness of the battle plan, the pace of the battle, and the ability of the pilots to carry out effective operations. In the latter, air support was dependent upon how far the request for support had to travel up the chain of command before the decision was made, and the

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41 Ibid., p.196.
ability of aircrews. The more command levels through which the request had to pass, the greater the delay and the more likely it was that the target or friendly troops had moved by the time aircraft responded. The Army Air Support Controls, units trained to accept or reject calls for close air support from forward troops and then to arrange the strikes, were first to be placed at Division level, but were eventually moved to Corps and then to Army level. The Allied system of command was unwilling to allow operations to be initiated at a lower command level without some way to exert control, as these command levels did not have access to all available intelligence.

At first glance, this seems to be a serious crippling of the close air support system, and until efficient C²I systems were developed, it was. Many opportunities were missed because of command and communication delays. The initial reason for the refusal to relinquish centralised control over aircraft was due to inadequate numbers and too many demands. However, it became quickly evident that where efficient C²I existed, this was the best way to make use of the flexibility inherent in air power. Air Marshal Coningham, the officer responsible for the development of tactical air power in the Western Desert and later Tunisia, put it well when he described a situation where a front formation reports a concentration of 200 M.T. and accompanying arms. Its request [for air support] is turned down. Fifteen or twenty miles away, however, there is a concentration of 2000 or more, indicating an armoured division or even larger forces. This concentration we know from experience will probably affect the whole battle area perhaps 10, 18, or 24 hours later. It is
this concentration which is receiving all the weight of air attack and that is why the comparatively little target on the front is ignored.\textsuperscript{43}

Without centralized control, where access to intelligence was greater, the available air power may have been thrown at the smaller concentration to the detriment of overall efficiency. This arrangement did not gain general acceptance in the RAF outside of the Mediterranean theatre. Indeed, on 6 November 1942, just before operation 'Torch' a study week at Camberley Staff College concluded that it was best to allot one Group to each field Army, stressing the subordinate role of the RAF.\textsuperscript{44} Curiously, a questionnaire submitted to Air Headquarters, Western Desert disagreed with this arrangement, arguing that decentralisation of control "would fail to produce the concentration of effort needed to achieve effective results, and denied the full use of the flexibility of air forces."\textsuperscript{45} However, this warning was not heeded, and both the RAF and USAAF began the Tunisian campaign with air power allotted to ground formations. Experience would show the centralised control of air power, with sufficiently flexible communication systems to allow for the rapid transmission of intelligence and orders, was the most effective way to employ tactical air power.

Ironically, at least conceptually the system for close air support designed in the desert shared much with its German counterpart. In

\textsuperscript{43} PRO AIR 23/1299, Air Power in the Land Battle (Air Ministry, 1943).
\textsuperscript{44} PRO AIR 39/129 Memorandum by GHQ Home Forces, Organisation and System of Control of Air Forces in Support of Overseas Operations, 6 November 1942.
\textsuperscript{45} Ibid., Questionnaire submitted to Air Headquarters Western Desert.
response to lessons learned in the Spanish Civil War, in Poland, and in France, the need to apply close air support in mass attacks became evident to the Germans. This led to close air support aircraft being controlled at higher command levels with access to constantly updated intelligence from the German Flivo liaison officers. These officers did not request air support, as in the British and American system, but merely passed on situation reports that "could be transformed into unit attack orders within minutes."  

However, the success of this or any close air support operation depended upon the ability to receive, analyse, and disseminate the intelligence in a timely fashion, on the air force’s ability to attack the target without suffering serious losses, and on the army’s ability to fight effectively. Until all of these prerequisites were in place, close air support played little role in the course of the land war. When they were in place, however, close air support was at times essential to victory on the battlefield, which was in turn essential to overall victory. Intelligence was a necessary condition to successful operations.

However, the multiplying role of intelligence in combat was sometimes degraded or entirely eliminated by weaknesses in the C^3I system of the force trying to make use of it. The ability of intelligence to speed the completion of the 'Boyd' loop was degraded for similar reasons.

Merely knowing of a potential target was useful only if the information reached a squadron before it was out of range, or the situation on the ground altered in such a way that the information became irrelevant. Since in a war of manoeuvre, targets for close air support or interdiction often moved quite rapidly, the response to intelligence had to be immediate. If action was stalled by the failure of communications, or the convolutions of the chain of command, the information might be rendered useless, the opportunity lost, and the expenditure of effort and resources in vain. Worse, the response to out-of-date intelligence was often inappropriate, leading on occasion to attacks on friendly troops.

Much of the difficulty concerning intelligence use comes from an inadequate understanding of the term, and thus it is important to define it. A central aspect of intelligence is its role as a force-multiplier - a means to maximize the efficiency of the use of force. This value is most notable when intelligence allows one side to throw its strength against an enemy’s weakness, or aids in the attack on a vulnerable and essential part of the enemy’s forces. The nineteenth century military theorist Carl von Clausewitz defined intelligence as “...every sort of information about the enemy and his country - the basis, in short of our own plans and operations.”47 Clausewitz’s definition referred to strategic intelligence, since the realities of command and communication during Clausewitz’s

time rendered tactical and operational intelligence useless. Large armies could not be easily controlled through verbal and written orders in a rapid fashion on the battlefield, nor could intelligence be consistently gathered, assessed, and acted upon in time. Consequently, Clausewitz’s definition is incomplete for present purposes.

A more precise description of intelligence refers to a process as well as a product - to the acquisition and interpretation of information. Before the raw information could be used to guide aircraft to their targets, its accuracy had to be assessed, it had to be considered in the context of other data, and decisions reached as to the best target for attack. Moreover, intelligence could only guide close air support operations if it was related to the strength, capabilities, and location of one’s own forces. Commanders needed to know where their forces were, and what they were capable of as much as they needed information on the enemy. Moreover, intelligence could only act as a force-multiplier if a competent military force existed to carry out operations.

Before the Second World War, the RAF divided intelligence into two forms - Pure Intelligence and Fighting Intelligence. Pure intelligence pertained to background issues, and fighting intelligence to the material used to guide specific operations. Similarly, American forces used the terms War Department intelligence and Combat intelligence. Modern

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historians use a different terminology, dividing intelligence into three forms: strategic, operational, and tactical. Given the close relationship between tactical air power and the battlefield, all three forms are relevant.

Strategic intelligence referred to information that illuminated the orders of battle of the Axis armies and air forces, as well as their dispositions, supply situation, possible intentions and capabilities. No single source provided all the required strategic intelligence. Instead, many sources were exploited to gather all the pieces of the puzzle, and highly skilled and experienced personnel were required to deal effectively with it all. An excellent example of the nature and value of strategic intelligence was the prediction of Rommel’s intent, based on captured enemy documents and signals intelligence, to take Tobruk on 23 November 1941. In addition to this, captured documents also confirmed the location and disposition of the German Afrika Korps. The location of 21st Panzer Division was pinpointed east of Gambut, and that of 15th Panzer Division between Gambut and Tobruk.49 Knowledge of this kind prompted the British to launch operation ‘Crusader’ to pre-empt Rommel’s plan.

An example of the value of strategic intelligence for interdiction comes through a reconstruction of the enemy supply system, provided by captured enemy documents, which was circulated as Eighth Army daily intelligence summary number 46 for 10 November 1941, and as the HQ

RAF, Middle East’s weekly intelligence summary number 74.\textsuperscript{50} The intelligence indicated that Benghazi was the railhead for Cyrenaica, and received supplies either by sea or road from Tripoli. Food, ammunition and petrol, off-loaded in Tripoli, were transferred to small steamers for Benghazi. These coastal steamers were the only ones that unloaded at Benghazi.\textsuperscript{51} Further information indicated the standard procedures, typical routes and schedules for transporting supplies from the ports to the forward dumps. This information allowed the RAF to track the Axis supply system, as well as tracing the accumulation of supplies, which was an indication of offensive action. However, it was necessary to confirm this information to eliminate the possibility that it was wrong or deceptive. Other sources of intelligence, such as photographic intelligence, could aid in this endeavour to fill in missing pieces.

Operational intelligence furnished the location of potential targets, and provided predictions of possible threats from enemy aircraft or anti-aircraft fire. Again, several sources supplied operational intelligence, the most important of which were various forms of aerial reconnaissance. When properly organized and integrated into operational planning, reconnaissance aircraft, guided by strategic intelligence, provided constant information on the location of suitable targets for close air

\textsuperscript{50} PRO AIR 41/25 The Enemy Supply System in Libya, Appendix Z, 10 November, 1941.
\textsuperscript{51} Ibid.
support, and thus allowed the RAF to launch attacks against the most appropriate targets with little wasted effort.

An example of this process for close air support comes from an operation launched in response to a reconnaissance report of “significant movement of enemy mobile forces eastwards, from their assembly areas, in the central sector” as the Eighth army was attempting to stop the Axis forces at El Alamein in July 1942.\textsuperscript{52} Nine Kittybombers of No.3 Squadron responded to this offensive, dropping 2750 pounds of bombs on “troop concentrations and enemy M.T. in the Mukheisin area, to the west of Deir el Shein.”\textsuperscript{53} Shortly afterwards, this same target was attacked by nine Boston bombers of No.12 SAAF and eighteen from No. 24 SAAF squadrons dropping over one hundred 250 pound bombs, “scoring at least seven direct hits on enemy M.T..”\textsuperscript{54} This was augmented by repeated attacks by both bombers and fighter/bombers that continued the attack until nightfall, dropping a total of 119,500 pounds of bombs. The result of this was that the attack “never got going.”\textsuperscript{55}

The Operations Record Book of 285 Air Reconnaissance Wing provides an excellent example of this process for interdiction. On August 26 1942, reconnaissance located two convoys moving east on the road from Gambut. One “of these was later attacked by Beaufighters with

\textsuperscript{52} PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.26.
\textsuperscript{53} Ibid.
\textsuperscript{54} Ibid.
\textsuperscript{55} Ibid.
good results.”®® Both of these examples show the link between reconnaissance intelligence and tactical air power.

Tactical intelligence included such things as updated target or threat information transmitted to pilots in the air, as well as information which aided pilots in acquiring their targets just prior to attack. For example, experiments in ground-to-air recognition were carried out to see if an aircraft using a long range signalling lamp could attract the attention of a moving car and signal a letter to it. Thus, friendly troops could signal their location, as well as the location of the target. This was found to be successful only up to a range of about half a mile and obviously could not be relied on as a ground to air emergency signal. An Aldis lamp however proved completely successful at Heliopolis in signalling to a plane at 6,000 feet and a limited number of these were immediately made available for issue to Army formations.®®

Tactical intelligence was also information such as particular landmarks (known as a bomb line) beyond which it was safe to attack without fear of hitting friendly troops, and was used to formulate tactics intended to maximize the damage and minimize losses during operations. For example, although armour was initially thought to present a poor target, it was found that a 250-pound bomb fused for instantaneous explosion was quite effective in damaging the tracks of the tank and the sighting mechanism for the gun, and destroying the radio antennae.®® At

®®LHCMA Papers of Major General McNeil 1/1 A1 Military Situation, Period 1st - 29th August '42.
®®AHB, Air Support, p.52.
least in the short term, this would make the tank unusable.

Consequently, although armour was not the best target, bombers and fighter/bombers could effectively attack it.

Each type of intelligence had its own period of timeliness, after which the information was useless, and no further return could be made from the effort expended in gathering it. Tactical and operational intelligence generally required swift processing in order to be used before their life expired. Strategic intelligence did not require such urgency, because the information often did not determine the success or failure of individual aerial operations. However, strategic intelligence provided information that gauged the effectiveness of those operations, and told commanders whether close air support and interdiction was worth the expenditure of resources. Although strategic intelligence did not have the high profile role of guiding aircraft to their targets, without it the RAF could not have gauged the effect of its air support operations, or learned of the layout, weaknesses, and capabilities of the Axis forces.

The useful life of any piece of intelligence varied with the distance between the landing grounds and the target, the speed of the target and that of the attacking aircraft, and the fluidity of the battle. The farther the aircraft from the target (or the more rapid the pace of battle) the more it would have moved from the place where it was originally located. This problem need not be a great obstacle, since the aircraft could simply search for the target. However, if the time delay was measured in hours
instead of minutes any delay in responding to this information could put the target beyond reach of attack. In the presence of significant enemy air strength, the process of searching endangered Allied aircraft.

The requirements for C³I systems were dictated by the characteristics of each theatre of operations. For example, on the Western Front during the First World War, where defences were extremely deep, and force to space ratios high, communications could, and largely did, rest upon thick layers of permanent land-lines. Conversely, in an environment such as the Western Desert, where the battlefield was large, force to space ratios were low, and operations were of a highly mobile nature, communications based on land-lines or civilian telephone circuits were extremely vulnerable to enemy action, and insufficiently flexible to meet tactical needs. In the mountainous regions of Tunisia, the range of communication equipment was severely limited by the terrain. Any C³I system needed to be tailored to meet the requirements of the theatre, and a balance had to be struck between the conflicting imperatives of speed versus security. Although landlines were difficult to maintain and were not well suited for mobile operations, they carried a larger volume of traffic and were much more secure than radio communications. On the other hand, although radio was more flexible, anyone within range could potentially eavesdrop and make use of the information. The defence against this vulnerability was a cure almost as bad as the disease. Even simple security measures could seriously impair
the communication system, and thus the ability to exert command and control over the fighting troops. Moreover, an overly cumbersome command structure containing unnecessary levels through which orders and intelligence had to flow added to the difficulties.

Every armed force required a hierarchical command structure. The ideal arrangement was to have as few intermediate levels between the top levels of command and the fighting units as possible. The more command levels that existed, the more likely that orders and directives would become confused and corrupted. Furthermore, intermediate levels of command often had their own immediate concerns, and never had access to the full picture. As headquarters became more remote, this was aggravated, causing subordinates to develop the belief that headquarters did not understand their situation, or its decisions were wrong. Aside from this possibility, the more convoluted the command structure the more difficult and time consuming communications became, since the information and orders had to travel through each tier of the structure. At a certain point, unacceptable delays were encountered in transmitting intelligence up the chain of command, and in the resulting flow of orders down to the fighting units.

Equally important to the C^3I system was command ability. Much damage could, and was, done to even an efficient C^3I system by incompetent individuals in key positions of the command structure.

During the Axis’ offensive against the Gazala line in May 1942, General
Ritchie (commanding the Eighth Army) ordered a withdrawal of some twenty miles. Instead of acting quickly to withdraw and reorganize their forces, British commanders hesitated. A South African staff officer expressed frustration at this inaction as he waited for the order to withdraw from the Gazala line: “Speed, I thought, must be the essence of any solution to the problem...Yet I had to wait another five hours whilst the Generals - Lumsden and Gott - considered their plans inside a huge Armoured Control Vehicle.” This kind of indecisiveness at a time when action was required ran counter to the effort expended in developing a capable C³I system. The delay also caused the erosion of wireless discipline amongst the British forces, paralysing the communication system.

Efficient communications were particularly important in the exercise of air power. Communication systems acted as conduits for the smooth functioning of command. One could liken the relationship between command and communication to that of a human body and its nervous system. Just as the nervous system carries commands from the brain to various parts of the body to enable it to carry out certain tasks, so too does a military communication system carry orders and intelligence. Any impairment of either part affects the whole. Without effective communications, and the flow of intelligence and orders it made possible,

commanders could not know how a battle was unfolding, where potential targets were, what enemy capabilities and intentions were, or indeed those of their own forces. Conversely, good communications were worthless without effective commanders. If one of these components failed, the effectiveness of the whole was necessarily degraded. While it was theoretically possible to conduct close air support or interdiction operations with an inefficient communications system, doing so would have been both inefficient and ineffective, as much intelligence would be uselessly stale by the squadrons who were ordered to act on it.

Just as intelligence traced enemy organisation and movements and helped to predict enemy intentions, so too did it allow the RAF and USAAF to judge the effectiveness of tactics and weaponry used during air support missions, and to adjust both to maximise the impact while minimising losses.\(^{60}\) Ironically, even without increasing the damage inflicted, merely reducing losses increased the effectiveness of air support. However, by also determining which targets were suitable for attack, and standardising the most efficient way of doing so, the efficiency of the whole improved all the more. Efficient tactics, however,

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\(^{60}\) Losses during close air support and interdiction missions could sometimes be quite high. However, although high casualties affected Allied morale, there is no evidence to suggest that pilots were unwilling to press home their attacks because of the risk. In a conversation on 10 June 1999, Squadron Leader Milt Jowsie, formerly of 93 Squadron RAF, indicated that the degree to which losses affected morale depended largely on the efficiency of the squadron’s commanding officer. Where the commanding officer was effective and enforced discipline, the effect of losses was minimized.
were but one necessary element in the development of effective operations. Equally important were sufficient numbers of suitable aircraft, effective armaments, well-trained pilots, and the ability to maintain these numbers under difficult conditions. Thus, continual reinforcements and the development of an efficient repair and salvage system were also major factors in the quantitative growth and the rise in the qualitative effectiveness of the RAF and USAAF, and allowed close air support to be applied when required and with more effect. Without these prerequisites, the competition for resources between interdiction and close air support operations would have been more pronounced, and both would have been more difficult to conduct. Intelligence was able to pinpoint targets for both, and command structures and communication systems allowed for the most economical use of Allied aircraft (which were becoming more numerous). Indeed, close air support and interdiction were complementary uses of air power.

The RAF and British army (and later the Anglo/American forces) had to overcome weaknesses in intelligence systems, command structures and communications, as well as weaknesses in the way their forces fought. By the middle of 1942, the WDAF/Eighth Army had done so, and the power and efficiency of British air and land power increased dramatically as a result. Unfortunately for the Allied forces in Tunisia, the British or American air and ground commanders preparing for operation ‘Torch’ had absorbed few of the hard lessons learned in the desert.
Consequently, they were faced with the same failures, which were only overcome with experience and the adoption of the doctrine developed in the Western Desert.

Efficient close air support, like any military operation, required the formulation of a coherent doctrine that not only existed in written form, but which was taught to and practised by those responsible for carrying out the missions. It was a constantly evolving process incorporating changes in technology, weaponry, and operational methodology. Before the beginning of the Second World War, both the USAAF and RAF had lost their doctrine for the application of close air support, and both found it difficult to evolve one under the stress of battle. By the end of the Tunisian campaign, the principles governing the application of close air support and tactical air power in general had evolved to a high level.

This dissertation will begin with an examination of the interwar doctrines of both the RAF and USAAF, and will argue that while neither air force had an evolved close air support doctrine, each possessed a theoretical understanding of the subject and had officers capable of creating a doctrine when the time came. The remaining chapters are chronological, and will show how with improved C^3I systems, aircrew ability, and the right kind of aircraft, the ability of the RAF and later the Northwest African Tactical Air Force to provide close air support improved dramatically. The dissertation will conclude by arguing that both the RAF and USAAF adopted the doctrine evolved in the desert, and this system,
which relied heavily on intelligence for its success, continued to govern
the control of tactical air power for the rest of the war and beyond.
In 1918 the Royal Air Force (RAF), and to a lesser degree the United States Army Air Service (USAAS), practiced a variety of air support operations with effect on the western front, but during the interwar years most senior British and American air commanders purposely overlooked the value of such operations. Attempts by the British army to control aviation for its own purposes, and similar attempts by the American army, worsened the situation and precluded any official discussion of air support. When war came, neither the RAF nor the United States Army Air Force (as the Air Service and later the Air Corps became known) were prepared to provide close air support operations as they had been at the end of the First World War. Some elements of what would become a close air support doctrine were understood between the wars, but neither force had a fully developed doctrine. This chapter will discuss why this was so, and to what degree, as well as illuminating some of the key figures in both air forces opposing the disintegration of close air support doctrine.

Much of the difficulty associated with the study of military doctrine comes from an inadequate definition of the term 'doctrine'. A good definition is "fundamental principles by which the military forces or

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elements thereof guide their actions in support of national objectives.”

It is often the blueprint by which armed forces determine their grand strategy, their operational objectives, and their tactics to attain them.

General Curtis LeMay, who commanded the Twentieth Air Force which undertook the strategic bombing campaign against Japan during World War Two, spelled out the importance of doctrine by arguing that

at the very heart of war lies doctrine. It represents the central beliefs for waging war in order to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilisation of men, equipment and tactics. It is fundamental to sound judgement.²

It is important to note that although all doctrine is based on a theoretical framework, it must also be reinforced by practice and experience, and is thus always in a state of evolution. It should be a rationally worked out program of how to employ aircraft, making use of their particular attributes, developed over time with experience, and it must be flexible in order to fit a variety of situations since armed forces never get the war they want. A doctrine not reinforced with practical experience could easily be based on theories that were totally unworkable.

Studying how commanders viewed the doctrinal process in theoretical terms, as well as if there were any serious attempts to test and fine-tune the theory behind the doctrine, can reveal much. Scholars

² United States Department of Defence Dictionary.
have defined this process as the 'doctrinal loop.' The loop begins with statements of military objectives, which are declarations of what the military is expected to achieve in broad terms based on the rationally perceived threats of the day and likely military situations. These guidelines are used to formulate new or revise existing doctrine, which, in turn, shapes the organisation of the military force, its training and equipment requirements, and its plans. The results of training exercises or actual combat experience are analysed to determine the practicality of the doctrine, and to provide input into the formulation of military objectives. In this way, doctrine should theoretically be constantly evolving, and should never degenerate into dogma - the last word on the subject. The danger of basing doctrine totally on theory was understood by both the British and American armed forces between the wars. In 1924, for example, Captain Mc A. Hogg of the Royal Engineers warned of the dangers of “doctrines based upon imagination, and not upon facts”.

Frequently, however, this warning was not heeded.

For an air force to have a close air support doctrine, many prerequisites had to exist. First, the value of this use of air power had to be understood and firmly believed at the highest levels; otherwise it would be unlikely to receive the necessary attention and funding. Secondly, practical exercises were required involving not only staff work,
but actual employment of aircraft in as realistic a fashion as possible. In this way, the necessary elements in a successful system could be determined, and the efficiency of the system could continually evolve. Intelligence staffs had to receive realistic training and experience in evaluating and presenting incoming intelligence to commanders who, in turn, had to understand the need to make rapid and correct decisions and issue orders for aircraft to attack the best of available targets in the context of the larger military picture. Moreover, since pilots had to execute the missions, constant training and practice in the tactical mechanics of delivering close air support was required to keep skills sharp. Through this training and practice, problems with C^3I systems, aircraft types, tactics, munitions, and pilot proficiency could be identified and addressed, and the doctrine evolved in a rational manner. Without this process, technical innovation mattered little. The USAAC, for example, received new and better types of aircraft suitable for close air support throughout the 1930s (such as the Curtis A-20 Shrike and the Northrop A-17), but its ability to conduct effective operations did not increase because of the lack of anything approaching a doctrine on the matter.® With a rational doctrine and its associated feedback loop, not only would both air forces have been able to predict the type of aircraft needed for effective close air support, but they would also have been able to make full use of their potential.

® Lee Kennett, op. cit., p. 51.
At the senior command level, neither the RAF nor the USAAC accepted the value of tactical air power of any kind, and although both forces maintained small groups of aircraft to be used in support of ground forces, the training, equipment, and personnel attached to these units was wholly inadequate. Instead, both forces focused much of their attention on strategic bombing as the only correct use of offensive air power. The reasons for this included a desire by both forces for independent status from the other services in the context of tight defence budgets, and the focus on strategic bombing as a means to this end. Given the geopolitical situation of the United States, strategic bombing made some sense, but the British were more likely to face a war in which close air support would have been an advantage. This desire for independence created a climate of hostility that precluded any serious consideration of inter-service cooperation, which was a central requirement of effective close air support.

However, the preoccupation of historians with the strategic bombing doctrine of both the USAAC and RAF ignores the existence of some serious discussion by some influential members of both air forces about the importance of developing a doctrine for close air support. Although this type of scholarship was important when the time came to develop a system for its application, it cannot be argued that either force had a fully evolved doctrine. Without constant training and practice, to train pilots and to test the theories, the doctrinal loop was not completed.
The consequences of the neglect of close air support became quickly evident when the RAF was called on to aid the army in France in 1940, and proved unable to do so with any effect. Ironically, a similar situation could have materialised during operation 'Torch' in late 1942 because neither the USAAF nor the rest of the RAF learned from the doctrine evolved in the desert. Because of a lack of a workable doctrine and poor C^3I, the Allied air forces were unable to offer any serious support during the initial drive on Tunis - a situation very similar to the battle of France in 1940. Before this, however, the disastrous defeats suffered in Norway and France, and the threat of war against Italy in North Africa, forced the RAF to consider the development of a doctrine for close air support. In so doing, an air force that had no intention of providing air support found (more by chance than because of any plan) that it had the tools to do so.

A by-product of Air Control operations and other small wars on the frontier of the British Empire during the interwar years was the fostering of relatively close co-operation between the army and the RAF, impossible in any other area of contact but essential to the success of operations. The often closely coordinated operations in Turkey, Iraq, the North West frontier of India, and in Palestine saw the application of air support as a common feature, and the command experience men like Coningham, Tedder, Marshal of the Royal Air Force Sir John Slessor, and Field Marshal Sir Claude Auchinleck gained during operations was important in
overcoming the steep learning curve facing the adoption of air support in the Western Desert during the Second World War. They learned the basic requirements of air support - efficient communications, good intelligence, a close relationship between army and RAF officers, and the centralised control of a force of aircraft under air force officers technically competent to make use of the flexibility of air power. Although the scale and scope of operations during this period bore little resemblance to those in the Western Desert and Tunisia, the principles still applied. The USAAC, by contrast, had no interwar combat experience, and its airmen had even less official interest in close air support than the RAF had. This was despite the development of a sophisticated close air support doctrine during the First World War, and a champion of this form of air power in the form of General Billy Mitchell.

It is necessary to trace the similarities and in particular the differences between how the RAF and USAAC lost their close air support doctrine, and to what degree elements of it remained in both air forces. The speed with which the British forces in the Western Desert were able to create an effective close air support doctrine in the desert owes much to interwar experience, as does the inability of the rest of the RAF and USAAF to do so until their combat experience showed the need to redesign their doctrine. When they did so, the Middle East system proved

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7 David Omissi, Air Power and Colonial Control, (Manchester: Manchester University Press, 1990), passim.
a valuable template.

Shortly after the end of the First World War, Mitchell wrote a Provisional Manual of Operations that reflected the experience gained in the war. He recommended that attack aircraft be concentrated into squadrons specifically trained and equipped with aircraft suitable for ground attack to enable them to be employed in a "concentrated, continuous, uninterrupted engagement at the decisive time and place". Despite this promising start, American attack aviation (as close air support was termed in the United States Army) atrophied during the interwar period even further than did that of the RAF. Ironically, Mitchell would later become a major champion of strategic bombing.

The evolution of United States air doctrine after the First World War reflected its ideas on the nature of warfare. At the end of that war, air power had as its main roles protecting friendly troops from air attack, and assisting in the destruction of the enemy's main forces through reconnaissance for the army or direct attack from the air. When the Americans entered the war in late 1941, by contrast, the influence of Billy Mitchell and Guilio Douhet had taken hold, and warfare was "the result of the persisting economic conflict among modern industrialised nations. Its purpose was seen as the elimination of rival production by

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destruction of economic facilities or by alteration of the enemy will to produce."\textsuperscript{10} The best way to accomplish these goals was through a precise attack on certain key nodes in the enemy's economic structure, and the best tool for this was the strategic bomber. Amongst most key USAAC figures any diversion of effort from this plan, such as attack aviation, was a waste of effort.

Although it would be an oversimplification to argue that attack aviation fell from grace solely because strategic bombing offered an independent role for the aviation arm of the American army, this was certainly a major factor. Even into the late 1930s the American policy of isolationism and the requirements of defence against opponents using Canada or Mexico as a base for an invasion of the United States, combined to reinforce the belief that bombing was the only important use for air power. Coupled with this drive for independence was distaste among aviators of being subordinated to ground forces which, according to General Ira Eaker (one of the pioneers of American air power), "wouldn't admit there was even such a thing as air power."\textsuperscript{11}

The focus on strategic bombing went hand-in-hand with the debate over who should control American air forces, and was often as bitterly contested an issue as it was in Britain. In 1926, General Pershing, the commander of the American Expeditionary Force during the First World

\textsuperscript{10} Thomas H. Greer, op cit, p.128.
\textsuperscript{11} Bolling Air Force Base, Washington D.C., United States Air Force Historical Research Agency (USAFHRA) Ira Eaker interview, K239.0512-829, p. 103.
War, summed up the argument when he said that an "air force, acting independently, can of its own account neither win a war at the present time, nor, so far as we can tell, at any time in the future." Most senior Air Corps officers, by contrast, argued that air power had made armies and navies less important because of the ability of aircraft to bypass them and strike directly at targets inside the enemy country. Major General Frank Andrews argued that the enemy seat of government would be "a bombing objective of high priority" with the first blow being "struck within a few hours after the decision to strike [had] been made". Industry would be destroyed, and those "whose Air Power was second class, would acquiesce with little argument to those who had superior Air Power.".

As did the Air Ministry and War Office in Britain, the USAAC clashed with the rest of the Army over the allocation of defence funding. However, where American airmen had (like their British counterparts) complained about a lack of financial support, it was the Air Corps that had received a disproportionate amount of the Army's budget, and had a continual supply of new aircraft. Indeed, the Air Corps Act of 1926 called for air expenditures totalling almost thirty-five percent of the Army's total budget. The Air Corps had drawn 5,867 officer and

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13 LC, Papers of Benjamin D. Foulois, Box 37, Address by Major General Frank M. Andrews before the National Aeronautic Association, St. Louis Missouri, January 16, 1939, p.13.
14 Ibid.
15 Hughes, op. cit., p.48.
enlisted personnel from other services, increasing the number of pilots by fifty percent, and had increased its total number of aircraft from 903 to 1646.\textsuperscript{16} At the same time, the Army was still using its First World War rifles, and the Cavalry received only forty-seven tanks, and more than half of its officers were still on horseback.\textsuperscript{17} This disproportionate funding was not lost on the rest of the Army, who were looking for an excuse to embarrass and thus downgrade the importance of the Air Corps.

This excuse manifested itself out of the attempt by the Air Corps to deliver the U.S. Mail in early 1934. On 9 February 1934, President Roosevelt cancelled the civilian airmail contracts on the promise from Benjamin Foulois (the Chief of the Air Corps) that the Air Corps could handle the job. Despite the optimism displayed by Foulois, the task was extremely difficult, given the scale of effort required, and the unsuitability of navigational equipment and aircraft to the task. Much of the criticism aimed at the Air Corps following a series of fatal accidents was motivated by Army figures who saw their chance.\textsuperscript{18}

The Air Corps soon found itself abandoned by even President Roosevelt, who declared that his faith in the Air Corps had been betrayed. Roosevelt wrote to Secretary of War George Dern and said that had he known of the incompetence of the Air Corps he would never have cancelled the civilian contracts, and that the "continuation of deaths in

\textsuperscript{16} Ibid.
\textsuperscript{17} Ibid.
The Army Chief of Staff Douglas MacArthur used this incident to show that the money spent on the Air Corps had been wasted, and should instead be spent on the more traditional arms of the Army. Roosevelt’s opponents also jumped at the chance to use the misfortunes of the Air Corps to further their own political ends. The result of this incident was a halt to Air Corps mail delivery as of 1 June 1935, the resignation of the Chief of the Air Corps, and far more ill-will between the Air Corps and the rest of the Army, making it more difficult to cooperate on testing close air support ideas with those few aircraft allocated for the effort.

During the interwar period, the USAAC operated only one attack Group of between two and four squadrons whose main role was that of reconnaissance. Indeed, the fate of this Group parallels that of attack aviation during the interwar years. It began as a Group of four squadrons engaged in patrolling the border with Mexico, but due to budget cuts, two of the four squadrons were declared inactive and disbanded. Further cuts “shaved the personnel complement of the remaining squadrons from 130 to ninety.”

Because the emphasis for American air doctrine was placed elsewhere throughout the interwar period, there was no serious interest in attack aviation.

At the same time, most of the military education of air and ground

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19 LC The Papers of H.H. Arnold, box 223, Letter from President Roosevelt to G. Dern, February 1934.

20 Muller, op. cit., p.175.
force officers was undertaken at the Air Corps Tactical School (ACTS) in Alabama, or at the Command and General Staff School (CGSS) in Leavenworth, Kansas. At the ACTS, which was the centre for the development and propagation of strategic bombing doctrine, only one course, entitled “Aviation in Support of Ground Forces”, dealt with tactical aviation, but strategic bombing doctrine pervaded even this course. According to the instructor, the “most valuable contribution the air force [could] make to the ground campaign [was] the successful destruction of targets deep inside enemy territory.”^21 Not only was it evident that the instructors were disdainful of the tactical use of air power, but the course only lasted a day, and accounted for one fortieth of the final grade.^22

The CGSS, by contrast, was concerned with the staff work associated with formations of a Corps or less. Although the official opinion on the value of air power held that “the strategic employment of bombardment aviation form[ed] the basis for the employment of the air forces as a whole”, the school’s focus made tactical aviation the only relevant form of air power.^23 In contrast to the course at the ACTS, the CGSS created an atmosphere conducive to experimentation and original thinking. Moreover, the focus of the course included combined operations between army and air forces. One exercise undertaken by

^21 Hughes, p.57.
^22 Ibid.
Major (later Major General) Pete Quesada, an innovator of American close air support doctrine, "contemplated a fictitious corps attack against an enemy retreating toward a river, and advocated using airplanes to cut off the crossing points" to isolate the battlefield. The course further presaged the use of tactical air power in the Second World War by emphasising the fundamental importance of aerial reconnaissance and aerial attack in assisting armoured formations ahead of the main corps. This useful instruction was important to those men able to keep an open mind about the potential uses of air power, a task especially difficult given the opposition by senior airmen. However, when the time came to evolve a system for close air support, and to modify it to fit changing situations, the experience of such officers like Quesada proved valuable indeed.

Events in the Spanish Civil War and later in Czechoslovakia and Poland foreshadowed a coming war in which it was increasingly likely that the United States would be committed to a major European land war. Together they gained close air support a wider audience. Indeed, Hitler's attack on Poland in September 1939 prompted President Roosevelt to call for a "program to provide 50,000 planes and a production capacity for at least that many each year." In addition, the president wanted the Air Corps to be the force to protect the Western Hemisphere against the

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24 Hughes, p.62.
25 Ibid., p.108.
threat from Germany and Italy. However, the influence of the ACTS still held sway over the planned use of these aircraft.

The Air War Planning Department (AWPD), which was created to plan for the continued expansion of the Air Corps and to devise methods for the successful use of air power against Germany, formulated the final statement on American air doctrine before the war, and embodied the ideas taught at the ACTS. Naturally, non-Air Corps officers expressed serious concerns with AWPD-1, as the plan was known, and with those who had engineered it. Even General Marshall, the U.S. Army Chief of Staff, expressed doubts about the plan, and Quesada considered Marshall "the fairest, most open-minded person I ever met in my life. I felt soon after I met him that he was a man who could rise above all the petty feelings between air and ground officers." Marshall felt the air staff "placed too much faith in the probability of success solely through the employment of bombing" and was unable to learn from the lessons of France and the Battle of Britain to design a workable air plan. But despite opposition from the Chief of Staff, the plan was adopted in September 1941 virtually unchanged. The report envisaged an Air Corps with ninety-eight bomber groups, but only twenty-six fighter and fighter/bomber groups, and close air support still ranked near the bottom

Hughes, p.47.

of Air Corps priorities.²⁸

The experience of the European war was taken into consideration, but little of that from the desert. This is understandable since the RAF and British army were struggling to overcome their own doctrinal and material weaknesses, however the lessons drawn from the events in Poland, France, and the Battle of Britain served only to confirm the correctness of strategic bombing doctrine as envisaged by Air Corps theorists. The Chief of the Air Corps sent officers, including his two most able commanders Carl Spaatz and George Kenney, to report on the conduct of the European air war. In May 1940, the War Department established the Special Observer Group in London to be kept informed of both technical and tactical developments.²⁹ Rather than focusing on the successful use of tactical air power by the German forces, and the lack of a comparable capability in their own force, the Air Corps officers (almost exclusively ACTS instructors) focused on the lack of strategic bombing in the Luftwaffe. It reported that had Germany possessed a doctrine of strategic bombing and aircraft capable of carrying it out, it could have "reduced Britain to a shambles in 1940."³⁰ Instead, it was argued that the Luftwaffe possessed aircraft that were deficient in bomb load, range and armour, and its fighters were unable to escort these bombers through the

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²⁸ W.F. Craven and J.L. Cate, I, op cit, p.148.
British defences. However, not all USAAC officers held this opinion. Quesada wrote in a letter to his mother on 20 April 1941, saying that the British Spitfires were "marvellous planes...and have single-handedly defeated the Boche in the sky." But most senior air figures focused on the evidence that supported their theories. Despite this bias, there was an increasing interest in the tactical use of air power, and its potential within the U.S. Army. Much of this interest came from ground force sources, but the interest was beginning to gain a wider audience.

Another body focusing on air power was the Air Board, which was appointed in March 1939 by the Secretary of War to make recommendations regarding the employment of air power, as well as its organisation and doctrines. Amongst the conclusions of the Air Board was a statement that correctly predicted that the Air Corps might not be able to supply ground support if the army became engaged on the ground. The conclusions were adopted by the Air Corps Board, which had been engaged in fulfilling General Marshall's request for a new statement on doctrine, in U.S. Army Field Manual 1-5 Employment of Aviation of the Army (FM 1-5) published on 15 April 1940. It contained some fairly

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32 LC Quesada Papers, Letter from Major Quesada to Mrs. Helen Quesada, 20 April 1941.
34 NARA RG 407, U.S. Army Unclassified Decimal File, File 300.7 Field Manual 1-5 Employment of Aviation of the Army, 15 April 1940.
sophisticated ideas on tactical aviation. This manual was approved after compromise between the General Staff and GHQ Air Force (the operational component of the Air Corps), and "represented a considerable attenuation of the air doctrine which had been distilled at the Tactical School, conforming rather to the more conservative general principles of airpower enunciated by the Air Board."\textsuperscript{35}

While arguing that support aviation was most effective when "secured through centralized control", the manual inferred a subordinate role for the air force commander as "the immediate assistant to the ground commander and adviser of his staff on all aviation matters."\textsuperscript{36} The method of support depended upon the stage of operations, and close air support was viewed as secondary in importance to interdiction of supply, and attack against troops and transport columns behind the front. Even during the battle phase, it was seen as better to isolate the battlefield from reinforcements and supplies rather than attacking targets at the front. Finally, it was thought that support aviation should not be "employed against objectives which can be effectively engaged by available ground weapons" and "was poorly suited for direct attacks against small detachments of troops which are entrenched or dispersed."\textsuperscript{37} Actual experience would have shown that efficient C\textsuperscript{3}I, and appropriate tactics and aircraft, allowed for the best target to be chosen from the

\begin{footnotesize}
\textsuperscript{35} Greer, p.113.
\textsuperscript{36} NARA RG 407, U.S. Army Unclassified Decimal File, File 300.7 Field Manual 1-5 Employment of Aviation of the Army, 15 April 1940.
\textsuperscript{37} Ibid.
\end{footnotesize}
available options - including close air support. Before the war, the RAF had similar feelings about the place of close air support amongst the possibilities, but experience in the Western Desert forced the acknowledgement of the co-equal status of the air and ground commanders, the necessity of effective C3I and appropriate aircraft and tactics, to be able to attack most targets effectively.

However, merely publishing a Field Manual could not undo the years of neglect of attack aviation, nor could it erode the opposition of most officers of the Air Corps. Indeed, one of the strongest proponents of strategic bombing doctrine, Haywood Hansell, later acknowledged that he and others got "carried away somewhat with the very thesis that I did my utmost to espouse", so much so that "we [had] decimated, we [had] emasculated our own force."38 Often manuals only reflected theoretical ideas that were frequently unsound. Even manuals based on sound ideas needed practical experience or serious training exercises to translate them into a complete doctrine. The lack of recent practical experience with close air support was a handicap and created the possibility that the Air Corps might absorb the wrong lessons.39 This shows the danger of interpreting doctrine according to manuals, as there was very little practical experience behind the theory, and even less official sanctioning of the very idea of tactical aviation. In other words, the situation had not

38 Hughes, p.55.
39 The only U.S. armed service with an effective close air support system was the U.S. Marine Corps. However, there was no inter-service communication between the Marines and the U.S. Army, and their doctrine had no impact on USAAC close air support. See Hughes, chapter2.
changed because of the adoption of FM 1-5.

An attempt to test the theories embodied in FM 1-5 was made in September 1940, when General Marshall ordered General Andrews and his operations staff to study the issue. Andrews recommended joint air/ground exercises to work out the coordination of close air support. Subsequently, Marshall directed Lt. General L. J. McNair, the Chief of Staff of the Army's operational command, to conduct tests to work out the details for applying close air support. But the tests suffered from a resistance from Air Corps officers who were pushing for increased independence, and felt that ground support was a subordinate role.40

Nor did the status of close air support change as a result of the convening of the Air Support Board in 1942 to address ground force commanders' concerns about the continuing lack of a doctrine for close air support. Indeed, Field Manual 31-35 Aviation in Support of Ground Forces, which resulted from the discussions of the Air Support Board, was less a doctrinal manual than it was a recitation of the need for the control of air forces by Army Air Force officers.41 The manual focused on the organization of air support rather than on plans for battlefield operations, or priorities for targets. The provisions for air support contained in Field Manual 31-35 were tested by a series of manoeuvres including both Corps and Army size formations. These exercises all

suffered due "to the limited amount of previous joint training" resulting in air officers being insufficiently "informed of the tactics and organization of ground units; conversely, ground officers lacked a proper appreciation of the capabilities and limitations of the air arm." Consequently, the system for air support adopted from the RAF in Britain without reference to the changes developed in the desert, did not receive an adequate test. Army figures expressed doubts about the provisions for close air support, and recommended further tests "involving perhaps changes in the currently published Air Support doctrines." The increasing interest in close air support arose too late to change the arrangements for operation 'Torch' which took place before the results of the final tests could be seriously considered. The USAAC thus possessed the bits and pieces of what would become a doctrine for close air support, but there was insufficient practical experience and no desire, by those in a position to do so, to acquire it. The USAAF, and the RAF taking part in the operation, were working with theories that proved unsuited to the test of battle. Air Headquarters Western Desert had made many changes, but their lessons had not been transferred to the rest of the RAF or the USAAF.

There are many parallels between the manner in which the USAAC lost its

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42 NARA, RG 337 Entry 55 Box 970, Memorandum from Headquarters Third Army to the Commanding General, Army Ground Forces, Washington DC, 25 November 1942.
43 NARA RG 337 Entry 55 Box 970, Memorandum from Col. D.M. Schlatter, Director of Air Support, to the Commanding General Army Ground Forces, Army War College, Washington DC, October 24, 1942.
close air support doctrine, and that of the RAF. Similar to the situation in the United States, during the interwar years the RAF’s leadership became equally obsessed with strategic bombing. However, by focusing on this issue, historians have largely overlooked the effect that wars on the frontier of the Empire had in keeping some of the tenets of air support alive. During these conflicts, relations between ground and air forces were by necessity much closer. Aircraft routinely responded to calls for direct support from the Army, flew protective cover, conducted aerial reconnaissance, and transported both supplies and troops. In doing so, intelligence proved to be fundamental to successful operations. Although at higher levels relations between the RAF and the army were often characterised by the disputes between the War Office and Air Ministry, at the operational and tactical levels cooperation was a standard element in operations. Both Tedder and Coningham had experience in these air control operations, and this experience proved extremely valuable when the time came to create a system for the application of close air support in the desert. It is thus important to note the extent to which, and in what form, the army and RAF cooperated during air control operations and small wars on the frontier, and how this differed from the situation in Britain. In many ways, the fall of close air support doctrine in Britain paralleled its fall in the United States army.

Just as with the American army, the fight between the War Office and Air Ministry over the control of air resources came quick on the heels
of the armistice in 1918, and indeed the roots stretched back into the
Great War. In its bid for independence, the RAF found in Winston
Churchill a staunch ally. Churchill believed that the RAF had the potential
to influence the strategy of the future, and it was he who advocated the
formation of an air force as part of a “unified, permanent branch of
Imperial defence, composed exclusively of men who will not think of
themselves as soldiers, sailors or civilians, but as airmen.”44 However,
this support, which undoubtedly had a great role to play in the
recommendations of the Smuts report of 17 August 1917, leading to the
amalgamation of the RFC and the Royal Naval Air Service under the
control of a separate Air Ministry, did not preclude Churchill from
drastically slashing the budget and size of the RAF when he replaced Lord
Weir as Air Minister in January 1919.*

From a strength at the end of the First World War of 291,170
officers and men and 22,647 aircraft in 188 combat squadrons and 15
flights, reductions were instituted which cut back the force to 25 ½
squadrons and fewer than 27,000 officers and men.46 However, this was
merely the reality of post-war Britain, and the British army and Royal Navy
were experiencing similar reductions from their wartime size. The
assumption underpinning the reductions and the maintenance of small

44 Royal Air Force Museum, Hendon, (RAFM) Trenchard Papers, CII/1, Memorandum by Churchill
to the Cabinet, 24 October 1919; Martin Gilbert, Winston S. Churchill, III, (London: Heinmann,
45 PRO AIR 8/3 The Second Report of the Smuts Committee, 17 August 1917; CAB 23/3, 233rd
meeting of the War Cabinet, Appendix II, August 1917.
46 PRO AIR 41/8 The Expansion of the Royal Air Force 1934-1939, p.2; H. Montgomery Hyde, op
cit, p.49; Liddell Hart Centre for Military Archives (LHCMA) Brooke-Popham papers, VII/22.
armed forces was that British security would not be threatened for years and then with plenty of warning before its armed forces would be required. During such a warning period, Britain’s economic strength would allow it to prepare. Unfortunately, in the 1920s this was no longer the case.\(^{47}\) It was thus in the context of shrinking defence budgets and defensive attitudes that the army and RAF clashed; the RAF attempted to ensure its own long-term survival, and the army sought to absorb the RAF in order to see that its air requirements were met and to usurp its budget; thus, “the struggle for money began”.\(^{48}\)

During the RAF’s initial bid for independence in the post-war years, Winston Churchill as Secretary of State for Air and the Chief of the Air Staff (CAS) Hugh Trenchard argued that the RAF could maintain order on the North-West Frontier of India and in the new mandates far more cheaply than could the army. Sir Henry Wilson, Chief of the Imperial General Staff (CIGS) from 1918-1922, disagreed, arguing that the existence of the RAF as a separate service was prohibitively expensive. He wrote:

To sum up, *we want as much Air Force and as little Air Ministry as we can get for our money*, and I think we have a right to ask that before any change is made in the direction of entrusting further warlike operations to the Air Ministry, a searching examination should be made of the financial effect entailed.\(^{49}\)


\(^{49}\) PRO CAB 5/4, The Air Force in Relation to the Army and Navy 150-C Memorandum by the Secretary of State for War, 28 September 1921, p.6.
Wilson also argued that it would be beneficial to put “an end to the Air Ministry’s unnecessary duplication of Naval and Military services and establishments”. This sentiment was echoed by the Quartermaster General in a letter to the Secretary of State for War. He complained that:

The Air Force when it comes down out of the sky must clearly have its territorial requirements provided for by the Army...this separation, which has been growing in strength during the last few months, is wrong in principle and wasteful in practice.®

Trenchard, naturally, was incensed by these statements, and fired back with his own memorandum that conveys a sense of the hostility between the two services for the entire interwar period. Trenchard wrote:

I have read Sir Henry Wilson’s note of the 28th September (C.I.D. 150-C) with considerable surprise. He admits that the General Staff memorandum of the 25th May...went far outside its terms of reference, but none the less proceeds to indulge himself in a still more discursive attack on the integrity of the Royal Air Force.

I shall wholeheartedly welcome any proposal for an independent and searching examination of defence expenditure, provided such examination includes the Army...I am confident that the results will support my contention that the air arm is our cheapest form of defence, and that, if only we are prepared to move with the times and leave the ruts of an obsolete dogmatism, the gradual transfer to the Air Ministry of certain functions hitherto vested in the War Office will make for economy.®

Churchill supported the RAF’s substitution plan because Wilson had rejected his role in it, Trenchard used it to further his own ends because

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® Ibid.
® PRO AIR 8/2, Quartermaster General to Secretary of State for War, 25 July 1919.
® PRO CAB 5/4, 151-C, Memorandum from CAS Trenchard to Secretary of State for Air, Oct. 17, 1921.
he realised what was at stake, and the British government adopted it as an economical means to retain possession of Mesopotamian oil reserves. Trenchard later argued that air control in Iraq had saved nineteen million pounds, and this vindication secured the continued existence of the RAF as a separate service. Success in imperial policing allowed the RAF the financial support necessary for the development of strategic bombing.

The main tenet of both RAF and USAAC belief during the interwar years revolved around strategic bombing, and was adopted at least in part because it was a role not easily filled by the other services. The RAF also argued that because of the risk of air attack by a hostile European power - the overwhelming superiority of the French air force and the souring of relations over the implementation of the Versailles Treaty forming the most serious threat until the rise of Hitler - the RAF must be allowed to develop an independent strategic bomber force as the only possible deterrent to this threat.

Strategic bombing became air doctrine, or more accurately an air dogma in both forces. Indeed, Hugh Trenchard referred to strategic bombing as “the Air Force Faith”. This doctrine was supported by insufficient evidence, and even less practical experience. Still, the RAF clung to this theory, because it was an alternative to the protracted

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53 Ferris, p.66.
54 Omissi, p.36, also p.38.
55 Ferris, pp.63-66.
56 PRO AIR 5/280, Memorandum to the Chief of the Imperial General Staff, 10 December, 1928.
trench warfare of the First World War, and thus attracted funding from politicians.

In fact, an interesting contradiction existed in the RAF's Manual of Combined Operations as late as 1938. By this time, single seat cantilever monoplane fighters were able to fly as high and as fast as bombers, and possessed offensive armament deadly to bomber formations. Fighter aircraft were designed to possess a high offensive value in air fighting. In defence of vulnerable points they are employed in conjunction with guns, searchlights and other components of an anti-aircraft defence organization to make enemy attacks so expensive that they cease to be a profitable enterprise. In addition they operate directly against enemy fighters and reconnaissance aircraft to preserve the freedom of action of our own aircraft, and to deny air reconnaissance to the enemy.  

However, in the same paragraph this was contradicted by the statement that the "main strength of an air force lies in its bomber squadrons, the aircraft of which combine a high offensive bombing power with an ability to beat off defending fighter attacks by means of the machine guns with which they are equipped."  

In addition to this blatant contradiction, almost no realistic effort was made to develop the means to translate the strategic bombing hypothesis into a sound doctrine or an effective fighting force. It was accepted as fact without any supporting evidence of its rationality.

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58 Ibid.
Consequently, elementary matters regarding defence against fighters, pilot training, or bombsights for precise bombing were misunderstood. When war came in 1939, the RAF squadrons in Egypt and North Africa were equipped with aircraft unsuited for any role, especially that of air support to ground forces, and they quickly found that bombers were very vulnerable to modern fighters.

The Air Ministry/War Office debate over the proper role for the air force was also fought by soldiers and airmen in the various journals of the day. As must be expected, there was something of a polarization of opinion along service lines, with air force officers insisting that the best use of air power could only be made by those who, through their familiarity with it, understood its potential and its limitations. There was also much reference to the correct use of air power being the bombing of key industrial targets deep in enemy territory, and not as an arm of the ground forces engaged in a futile battle of attrition. Army officers countered that no victory could be attained unless the enemy’s army in the field were destroyed, and “it was as an auxiliary arm in close cooperation with the naval and military forces that the best work of the Royal Air Force was carried out.”

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However, although the articles tended to group themselves around the issues of strategic bombing against the air requirements of the army, there were some RAF figures arguing in favour of the type of air support that would become common during the Second World War. Moreover, it was evident that many understood the operational requirements of doing so. Most notably were Wing Commanders Trafford Leigh-Mallory and J.C. Slessor, both of whom wrote several articles relating to air support for the army.

Leigh-Mallory's most notable contribution to the debate was his emphasis of the importance of maintaining air superiority as an important element in facilitating the success of a land campaign, and in his discussion of how aircraft could assist armoured forces through guiding vehicles to their objectives and communicating intelligence to the commanders of the armoured fighting vehicles. He also suggested the possibility that the RAF could, "by means of an attack of bombers and fighters on an enemy column", delay it long enough to allow the armoured forces to catch and attack it. This was quite revolutionary talk, especially from so senior an RAF officer, but it reflected his experience at the army's staff college at Camberley as the Air Force member of the Directing Staff - a position at which Wing Commander John Slessor

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Like Leigh-Mallory, Slessor was a member of Hugh Trenchard’s staff, and it was clear that Trenchard thought a great deal of Slessor’s scholarly ability, as he used Slessor as a ghost writer for many of his speeches and articles well into the war years. It was also clear, however, that Slessor differed in his opinions concerning the capabilities of air power and its role in war, as became evident in his influential book entitled *Air Power and Armies*, and in his gold medal essay in the Journal of the Royal United Service Institute in 1937. His Air Ministry tour being cut short in 1930 by an illness, Slessor took up a position once again closely associated with the army, spending the next four years at Camberley as the RAF member of the Directing Staff. It was during this period that he wrote the *Army Co-operation Manual* and *Air Power and Armies*. Slessor was then posted back to India commanding No.3 (Indian) Wing during the Kaisora operations in Waziristan during 1936-1937, where he put many of his principles into practice. For the last years of peace, he worked first as Deputy and then Director of Plans, where he remained until late 1940, working both for the CAS on the development of RAF policy and for the Chiefs of Staff as Air Member of the Joint Planning Committee.

Slessor's early writings and lectures dealt with land/air warfare, as

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64 Ibid.
opposed to mere Army co-operation, in the form of "direct support of armies by air forces as opposed to mere reconnaissance and observation for artillery" and were worked into a book entitled *Air Power and Armies*. Slessor wrote that land and air operations should be planned by army and air force officers acting in conjunction, with each as the expert in his own area, not with the Air Force acting as a subordinate arm. The air force possessed the flexibility to react quickly and attain a strategic concentration to meet operational requirements, but only if handled by air force officers with the technical competence and experience. There was, perhaps, nothing revolutionary in this idea, but his thoughts on how to aid the army during battle varied considerably from most RAF officers. In addition to direct support on the battlefield, the air striking force was to attack the communications serving the enemy’s army, to disorganize and delay the reserves coming in to support his forward troops, and to prevent traffic bringing up food, ammunition, and the mass of other material essential to their continued resistance.

Thus, air power could be focused against a variety of targets to directly affect the course of battle.

The influence of Slessor’s ideas about the role of air power in warfare is evident in the *Manual of Army Co-operation*, which he authored in 1930. Although the title suggests that the manual was intended only for Army Cooperation squadrons, the manual outlined the

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65 Slessor, *The Central Blue*, p.94.
principles for the employment of all types of aircraft in a variety of situations. Moreover, the importance of good signals communication between army and air force units was stressed, as was the need for effective intelligence and the ability to communicate it in a timely fashion. Indeed, from a reading of this manual, one is surprised that the RAF did not have the ability to conduct air support operations in 1940. The manual, however, was never implemented in Britain because the principles were not officially believed, and the required inter-service cooperation was not forthcoming. This was something that the USAAC shared with the RAF in Britain.

The relationship between the RAF and the army in Britain remained poor for the entire interwar period. Because of the divergent theories concerning the role of air forces in future European wars, one can hardly be surprised that disagreements occurred. However, the virulence of the hostility between the army and RAF was nearly as bad as those conflicts over the control of Naval aviation, but these at least were essentially settled by 1937, at which time relations between the RAF and the army worsened. The depth of resentment and bitterness between the army and RAF in Britain completely precluded any serious consideration of the provision of air support.

The British army’s Field Service Regulations acknowledged the ability of bomber aircraft to “combine the direct support of the military operations with the assistance of the maintenance of a favourable air
situation" by bombing "the vital centres in the system of command and maintenance" and columns of "troops and transport, especially if concentrated in defiles." Prerequisite for these kinds of operations, however, were close relations between the RAF and army, as well as experience in translating the theory into reality. In the absence of such cooperation and experience, it was unlikely that the independent bomber force would be willing or able to come to the army's aid.

The only squadrons that could be counted upon, and indeed the only aircraft which figured prominently in the army's plans, were the Army Co-operation squadrons. The primary function of these squadrons, which were allotted at the rate of "one for each division and one for each corps headquarters", was to provide reconnaissance and photography, and to drop supplies to troops. Only in exceptional circumstances would these squadrons be called upon to attack ground targets, and Army Cooperation aircraft were unsuited to do so. From the standpoint of serious support to ground forces the maximum provision of one squadron of Lysanders for each division was completely inadequate, and any additional support was uncertain.

For much of the interwar period, flying with Army Cooperation squadrons was "a nice, gentlemanly business", and very similar to the exercises conducted by the American army, the actual manoeuvres

involving both army and RAF units were very rare and not at all sufficient for developing the mechanics of air support.\textsuperscript{70} The Army Cooperation Report for 1927 remarked that the experience this year has shown that the fighter squadrons which have been detailed to provide co-operation do not generally understand the principle of attacking troops on the ground. This lack of knowledge is due to the small amount of practice which has been afforded them.\textsuperscript{71}

The following year’s report noted that at any rate the employment of fighter squadrons in close cooperation with ground forces was only experimental and it was uncertain that in time of war fighter squadrons would be available for this purpose.\textsuperscript{72} Moreover, only Army Cooperation officers from the RAF attended the War Office exercises during 1928.\textsuperscript{73} Often, these exercises were conducted without troops - just the staffs were involved - and the attachment of RAF staff officers to army units was discouraged because it was “found that these officers had little opportunity of obtaining useful experience because the army staffs were fully employed in their normal duties complicated by the short duration of the exercises.”\textsuperscript{74} It was therefore decided that if RAF staff officers were “to be attached during future exercises, these attachments [would] be to RAF units and formations only.”\textsuperscript{75}

In 1934, the CAS, Sir Edward Ellington, reported to the Chiefs of

\textsuperscript{70} Sir John Slessor, \textit{The Central Blue}, pp. 42-43.
\textsuperscript{72} PRO AIR 10/1759, Army Co-operation Report 1928, p.21.
\textsuperscript{73} Ibid., p.7.
\textsuperscript{74} PRO AIR 10/1777, Army Co-operation Report 1929, p.7.
\textsuperscript{75} Ibid.
Staff Sub-Committee that the only contact the army had with the air
force was through its Army Cooperation squadrons, and that "their
contact with bomber and fighter units only took place at certain times
during higher training exercises." In general, the training exercises took
place on Salisbury plain (one of the few places in Britain with sufficient
space for Divisional manoeuvres) over the course of one or two days.
Not only were fighter and bomber pilots ignorant about the tactics of
offering close air support, there was very little understanding of the
workings of the other service's staff, and inter-service communication
was discouraged. Thus, in the only area where there was contact, the
duration and scope of the operations was insufficient to offer any serious
lessons. Moreover, the climate created by the flurry of memoranda in
which the Chiefs of the respective staffs took shots at each other added
to this spirit of disunity.

Thus, there were many similarities between the interwar conditions
in the RAF and USAAC. On the one hand their leadership focused on
strategic bombing as the only correct use of air power, and on the other
hand the environment created by infighting between army and air force
officers precluded any serious discussion of close air support by those
who showed an interest. Moreover, there were no serious or realistic
tests in either air force of existing provisions for delivering close air
support. At the same time, however, there were officers in both forces

PRO CAB 53/5, Chiefs of Staff Meeting, 1 November 1934.
who continued to discuss the means by which close air support should function in future conflicts. However, a distinction must be drawn in the case of the RAF between Britain and the rest of the Empire. The spirit of disunity fostered by the disagreements in Britain was not typical of the British armed forces in Africa, Northwest India, Iraq, or Palestine. In these regions, relations were at times close, but even at worst were certainly much better than those between the Air Ministry and War Office in Britain. The difference in relations between the different areas was important, because although elements of air support were worked out in the frontier wars and in training in Egypt, the hostility between the CIGS and CAS, and the increasing amount of distaste shown to such operations by air officers, prevented it from being adopted as a general doctrine.

Egypt was the site of some very useful training schemes during the interwar period. The general conditions in the area "led to the development of a close co-operation by bomber squadrons with the various Army Formations within the command", and saw an "increased number of schemes in which bomber squadrons provided all forms of reconnaissance, practised the dropping of supplies by parachute and added message picking up and dropping to their normal inter-communication methods." 77 Moreover, the attitude towards inter-service cooperation was completely different than that in Britain. The General-Officer-Commanding the British Troops in Egypt was, during the early

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77 PRO AIR 10/1914, Army Co-operation Training Memorandum, 1934, p.6.
1930s, General Sir Jock Burnett-Stuart. Burnett-Stuart was one of the “voices in the wilderness” in favour of close relations with the RAF, and he thought that RAF officers were the only ones with the skills to know how best to employ aircraft in support of the army. In 1937, he wrote a scathing condemnation of the army’s manual *Employment of Air Forces with the Army in the Field*, in which he denounced the practice of using the Air Officer Commanding RAF units “purely in an advisory capacity so far as operating is concerned, a procedure that is contrary to all army principles, and likely sooner or later to break down in war.” He further presaged the state of operations in the Western Desert when he indicated that communication between Divisional Headquarters and aerodromes may be a “condition that will seldom arise, and certainly not at the outbreak of operations.”

Burnett-Stuart clarified the method in which both Army Cooperation squadrons and independent bomber and fighter squadrons should be employed in support of the army in a 1931 training memorandum. He noted that although 208 Army Cooperation squadron was “at our disposal” the rest of the RAF was always ready to assist, provided specific missions were requested. He emphasized that it was important to give

your airman as much help as you can; tell him what you expect him to see, and where you expect him to see it,

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79 Ibid.
80 LHCMA, Sir Jock Burnett-Stuart Papers, I/I, Training Memorandum, 1931, p.3.
what your own intentions are and what area or roads or defiles...you want him to investigate; or if it is a matter of bombing, or fighting, give him an objective. Don’t just ask him to go out and scout, or to go a-bombing - give him a definite mission.\textsuperscript{81}

This spirit of cooperation was typical not only of Egypt, but of the other fringes of the Empire where operational requirements called for air support of the army. In these areas, many of the principles set out in the \textit{Manual of Army Cooperation} were implemented, and the operational and command experience gained by men like Field Marshal Sir Claude Auchinleck, Marshal of the Royal Air Force Sir John Slessor, Air Marshal Sir Arthur Coningham, and Marshal of the Royal Air Force Sir Arthur Tedder would prove to be important when the time came to evolve a system of close air support to meet the test of battle.

After the end of the First World War, Tedder was given command of 274 (later 207) Squadron. In 1921 he took 207 to Turkey as part of the British Expeditionary Force deployed during the Chanak Incident, gaining him more valuable experience of working closely with the army. Moreover, Tedder continued a close association with Slessor throughout the interwar period, and received copies of Slessor’s writings relating to air operations in conjunction with the army.\textsuperscript{82} These ideas, combined with Tedder’s experience and personality would allow him to function

\textsuperscript{81} Ibid.

\textsuperscript{82} Tedder was included on the distribution list of many of Slessor’s papers on air control. In particular, see AIR 75/27 Official Papers of MRAF Sir John Slessor, Air Control. The Other Point of View, 193, p.2. In this paper, Slessor outlined the importance of ground troops in Air Control operations.
smoothly when dealing with army figures, with the understandable exception of Montgomery. Tedder understood the value of combined operations and the need for the commanders of the services to be in close contact, especially during operations. To this end, when he took command of the RAF in the Middle East in May of 1941, he moved his headquarters so that it was situated adjacent to that of the army. When the time came to implement methods of delivering air support to the army, Tedder’s beliefs, experience, and personality served the British well.

Similarly, Arthur Coningham gained valuable experience in the skirmishes with the Turks on the northern border with Iraq in 1922. Coningham and his fellow squadron members “cooperated closely with ground forces by dropping supplies and keeping them informed about enemy strength and movements”, but they also bombed and machine-gunned Turkish invaders. Indeed, so much practice was gained during these operations that the leader of the rebel force Sheik Mahmoud was referred to as “the Director of Training.”

Coningham came to share Air Marshal Salmond’s (a future CAS) beliefs concerning the importance of the experience gained in Iraq. Salmond reported to the Air Ministry in 1924 that aircraft can aid “in direct attack on ground targets by providing covering or supporting machine-gun fire; they disperse hostile forces and, when necessary,

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83 RAFM Tedder Papers, Lecture given to RAF Staff College, Andover entitled “Air Aspects of Combined Operations”, undated.
85 Ibid.
impede the escape of those forces by attacking bridges, fords or
mountain defiles." Coningham came to believe that without intelligence,
communications, supplies and close relations with the Army Commander,
this type of air support was not possible. The evolution of these beliefs
combined with the experience gained in operations in Iraq would make it
easier for the RAF to provide air support in the Western Desert.

Wing-Commander Slessor had the opportunity to put into practice
his theories about air power when he returned to India in command of
No.3 (Indian) Wing in 1936. In particular, 20 Squadron at Peshawar
organized a system of attack known as the V.B.L. (Vickers-Bomb-Lewis),
in which aircraft dived at its target and used its forward Vickers machine-
guns to keep down enemy fire. Once over the target the bombs were
released, and the rear-gunner sprayed the target with its Lewis guns to
suppress anti-aircraft fire during the egress. That the equipment and
tactics used during these operations would differ enormously from those
of the Second World War is not the issue. The important aspect is the
genuine attempts to find workable methods of offering air support, as
well as the understanding of the requirements for such support. The
lessons learned during operations were incorporated into a Manual of
Frontier Operations and a brochure entitled Close Support Tactics -
Provisional, and "may be recognized as bearing at least a close

88 PRO AIR 23/542, Report by Air Marshal Salmond to the Air Ministry on his Command in Iraq,
April 1924.
resemblance to some of the principles of land/air warfare which crystallised in the Desert fighting of 1942 and 1943 and served us so well in the great campaigns in Italy, France, and Germany.®®

These principles included an independent air force commander who would act when necessary to “bring down his fire when it is obviously wanted, with the minimum of delay.”®® The necessity of adequate signals communications between air and ground units was stressed, as well as between airfields and command headquarters. Facilitating the flow of intelligence and orders was “the crux of the whole matter”.®® The weaknesses of existing signals equipment and the need for a system of target identification were identified, and steps taken to alleviate the problems. Recommendations for up-to-date W/T and R/T sets were made, and schemes including the use of smoke shells to identify enemy troops and orange strips for friendly ones were instituted - the same systems later used in North Africa.

It was also well understood that intelligence, both before and during a campaign, was vital to the success of operations. A memorandum entitled "Tactical Methods of Conducting Air Operations Against Tribes on the North-West Frontier of India" stressed that accurate intelligence before and during operations was essential to the “successful

®® Ibid., p.128; PRO AIR 75/31, Combined Report on Air Cooperation Training, 2 (Rawlpindi) Infantry Brigade and 3 Indian Wing, November 1936, pp. 5-6.
®® Slessor, The Central Blue, p.129.
application of air power in frontier Operations”. Intelligence was employed before and after operations to determine the correct amount of pressure required to force compliance with the government’s orders, and to check the effectiveness of attacks. In one instance during the fighting in Bajaur, photographic intelligence showed that “considerable damage had been done and that any further bombing would be a waste of effort.” On the basis of this intelligence, further bombing raids were cancelled.

Taken as a whole, the experience of the operations on the frontier of the British Empire was important when the necessity of providing air support appeared after the Battle of France in 1940, but it cannot be argued that the RAF as a whole possessed a doctrine of close air support based on these experiences. The operations in most cases were of a limited nature against poorly armed defenders, and although many important lessons were learned, the hostility against this type of operation prevented it from spreading to the whole air force. It is evident that the Air Ministry had no intention of diverting aircraft away from other purposes to answer calls for support, and ignored all arguments in favour

90 PRO AIR 75/29, Air Staff (India) Memo No.1 April 1935; also PRO AIR 75/31 Combined Report on Air Cooperation Training, 2 (Rawalpindi) Infantry Brigade and 3 Indian Wing, November 1936, pp.7-8.
91 PRO AIR 75/28, Report to The Secretary, Military Department India Office, by the Air Officer Commanding in India on the Air Operations in BAJAUR 21 July, 1933 to 13 August, 1933. For example, air photographs taken of each attack and at the end of each day’s bombing were used to gauge the effect and based on this information it was determined whether to continue the bombing.
92 PRO AIR 75/28, Report to The Secretary, Military Department India Office, by the Air Officer Commanding in India on the Air Operations in Bajaur 21st July, 1933 to 13 August, 1933.
of it. Thus, General Ironside, the CIGS, wrote in 1939 that he was disgusted “with the way in which the R.A.F. treat[ed] the co-operation of the Air Force with the army.” That such statements were being made at the outset of the Second World War indicates the level of the schism between the RAF and the army in Britain.

The result of this long-running dispute was the inability of the RAF to offer the level and type of air support required of the British Expeditionary Force in the Battle of France. The official view of the Air Staff was reaffirmed in a memorandum issued in November 1939 entitled “Bomber Support for the Army”. This document was widely circulated as a synopsis for lectures given to RAF squadrons and army units during the first winter of the war. It argued that “neither in attack or defence should bombers be used on the battlefield itself, save in exceptional circumstances...All experience of war proves that such action is not only very costly in casualties, but normally uneconomical and ineffective.”

Thus, the Air Staff and the General Staff were divided over the correct use and control of aircraft, and although the Air Staff offered the possibility of support in the form of deep interdiction, in practice neither side was willing to accommodate the other.

In contrast, the German armed forces had developed and fine-tuned

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their close air support doctrine during the interwar period and early campaigns of the Second World War. Through the leadership of men like the Chief of the German General Staff, Colonel General Hans von Seeckt, and key Reichswehr air staff officers like Helmuth Wilberg, the German armed forces learned from the combat experience of the First World War, and were able to develop and refine an air doctrine that included effective close air support.\textsuperscript{95} The campaigns against Poland and France proved not only the effectiveness of the German close air support doctrine, but also how impotent Britain’s was.

The disastrous campaign in France highlighted problems of command, control, communications, and intelligence in both the RAF and British army. These failures rendered the meagre provisions for air support ineffective, and contributed to the rapid defeat of the British army by a qualitatively superior German force possessing a fully evolved air support system. It is unlikely that air support vastly superior to that available in France would have turned defeat into victory, as the British and French armies were plagued with their own doctrinal, material, and structural flaws that did not enable them to compete with the fast-paced war the Germans imposed. But snatching victory from the jaws of defeat is an unrealistic criterion by which to judge close air support. At best, it

\textsuperscript{95} For a discussion of the Luftwaffe’s close air support doctrine and why the German forces were so well prepared to apply and exploit close air support early in the war, see James S. Corum, “The Luftwaffe’s Army Support Doctrine, 1918-41”, \textit{Journal of Military History}, 59 (1995), James S. Corum, \textit{The Luftwaffe’s Way of War}, (Baltimore: The Nautical & Aviation Publishing Company of America, 1998), James S. Corum, \textit{The Luftwaffe: Creating The Operational Air War, 1918-1940}, (Lawrence Kansas: University Press of Kansas, 1997).
was a necessary condition for victory, never a sufficient one.

However, the speed at which the German armoured columns advanced completely paralysed the communication system and command ability of both the British army and the RAF, making air support virtually impossible. The inefficient and fragile communications of the British forces could not respond fast enough to this style of warfare. In a very short period, the British Air Forces in France were completely out of touch with army formations, and calls for air support had to be arranged by telephone or telegraphic requests from the British Expeditionary Force through the War Office in London. After the 19th of May, the RAF component was withdrawn from France, leaving the army to its fate, and failures in communication limited the ability of the army to request any form of support from the Army Cooperation squadrons that remained.

The disastrous events in France provided the impetus for cooperation that had not existed in Britain throughout the interwar period, but did little to change things in the USAAC. The result was the logical evolution of a system of air support for the RAF designed to have "the speed and efficiency comparable to that of the GAF." On 2 August 1940 it was decided at a joint Air Staff/General Staff meeting to conduct a series of trials to develop the most appropriate methods for close support of the army. The results of the trials, which took place in

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Northern Ireland from 5 September to 28 October, were incorporated in
a report prepared by Lieutenant-Colonel J.D. Woodall and Group Captain
A. Wann. Both the RAF and USAAC adopted the concepts of the Wann-
Woodall report, but the combat conditions in the desert completed the
doctrinal loop and substantial changes were implemented to the system
early in the desert war. Unfortunately, opposition to these changes did
not allow them to be adopted by either the USAAF or the rest of the RAF;
only the requirements imposed by the failure of close air support in the
early Tunisian campaign would force the adoption of the Middle East
system of close air support. Intelligence was fundamental to the success
of this system.

One cannot understand how far intelligence accentuated the
flexibility of air power without examining the command and
communication structures of the army and air force, and the relationship
between them, because these either facilitated or impeded intelligence
use. Before the introduction of a specialised system for the control of air
support, intelligence and requests for support often had to travel along
normal communications nets, which often broke down during operations.
In addition, Air Support Controls were "frequently used for purposes other
than those connected with Air Support." 99

Understanding the complete C^3I systems of the armed forces, of

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98 Ibid.
99 PRO WO 201/488, Notes on Direct Air Support, Cyrenaica, Nov-Dec 1941.
which the Air Support Controls were but a part, is thus crucial to an understanding of the effectiveness of close air support. Since the C^3I systems of 1942 and 1943 evolved from pre-war forms that did survive the test of battle, one has to examine the evolution of command structures, communications and intelligence use over the course of the campaigns. Thus, the chronological chapters that follow will each begin with a look at the changes to the C^3I systems during the period under study. They will also incorporate other important changes such as the evolution of appropriate tactics for the aircraft conducting the missions, and the adoption of aircraft more suitable for close air support operations. As close air support functioned alongside army operations, its effect can only be determined in the context of the ground campaigns as a whole, and the effect of these changes will be demonstrated through their impact on the course of the land battle.
Chapter 2: Close Air Support from 'Compass' to 'Crusader'

The early attempts by the RAF to provide close air support suffered from a lack of a fully developed close air support doctrine, and thus initial efforts were weak and inefficient. However, against a largely unmotorized and qualitatively inferior Italian army in the first months of the war in the desert, they were surprisingly successful and out of proportion to the effort involved. The constant bombing, both day and night, even with a small number of British aircraft had a telling effect on the morale of the Italian army, and hastened its collapse. This success was cut short by the entry of the German Afrika Korps into the theatre, forcing the British to fight a rapid mobile war for which they were unsuited. Their entire approach to air support had to be re-thought, including the introduction of more efficient procedures for dealing rapidly with incoming intelligence to enable it to direct attacking aircraft. However, these changes mattered little until the British army learned to fight effectively, and to integrate close air support into its battle plans. Developing such a system was time consuming, costly, and had to be accomplished at a time of great stress.

All of these problems stemmed from a loss of close air support doctrine between the wars, but the practical combat experience of the Air Control operations proved important to its redevelopment. Thus, the RAF was able to apply a tested template to the need for effective close air support. There were no shortage of difficulties, and it was not until mid-
1942 that they had been largely overcome, but when they were the power of the RAF to conduct close air support operations improved dramatically. However, close air support is by its very nature closely connected with the ground campaign, and failures on the ground could not be overcome by close air support alone. This chapter will trace the changes to British C^3I systems in response to lessons learned during operations, and the effect of these changes on the ability to deliver close air support. It will also show the effect of RAF close air support on the ground battle.

On 22 June 1940, with the signing by the Compiégne armistice between France and Germany, the Italian forces near Tunisia joined those facing the British on the Egyptian frontier. The British estimated that the total number of enemy troops east of the Egyptian frontier was about 80,000, with 120 tanks, and the total number of Italian troops in Africa was 327,000.¹ The British forces in the Western Desert, consisting of roughly 31,000 men and 275 tanks, thus faced a numerically superior enemy, but one that was largely unmotorized, possessed inferior armour, and showed "little enterprise or power of manoeuvre."² Field Marshal Erwin Rommel described the effect of unmotorized infantry as being of "practically no value against a motorized enemy, since the enemy has the

² PRO CAB 106/918, Wavell, Despatch, p.4.
chance in almost every position, of making the action fluid by a turning movement round the south." Any understanding of the success of the British advance in December 1940, and the role of close air support, must take into consideration the difference in composition and quality between British and Italian forces. The British were fortunate that this was so, as the operations against the Italian forces were run with a confused command structure, poor communications, few and generally obsolete aircraft, and very little operational and tactical intelligence. Strategic intelligence, because of its longer life span, was better, but intelligence staffs at all levels were lacking in experience.

For some time before 1939, the Government Code and Cipher School (GC&CS) at Bletchley Park, England, had broken and was able to read the traffic of the Italian colonial and diplomatic services, that of the secret service in Spain, as well as the high-grade ciphers used by the Italian army, navy, and air force in the Mediterranean, East Africa, and Libya. The fact that the Italian armed forces communicated entirely by radio in ciphers they could not easily change, and on frequencies which the British were able to monitor, made the job that much easier. Thus, the British noted the transfer of 17,000 troops to Libya at the end of May 1940, as well as the move of an additional 122 bombers to Sicily.

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3 Liddell Hart (ed.), p.91.
5 Ibid.
6 Ibid.
first months of the war, prior to the entry of Rommel's Afrika Korps, the British had virtually unlimited access to its enemy's codes and ciphers in what has been described as a "perfect (if rather miniature) example of the cryptographers' war." 

The impact of this type of access to the enemy's secret transmissions was dramatic. Operationally useful information was often too stale to guide close air support operations, but information on enemy order of battle, supply state, and serviceability rates were helpful in planning offensives where air support would be needed. Thus, the link between strategic intelligence of this type and close air support was indirect, but important to success.

The exploitation of high-grade communications was not the only form of signals intelligence, and the British also intercepted low-grade Italian signals. This activity, commonly known as 'Y', is far less well studied and understood than the exploitation of sources such as Ultra, but was beneficial to many military efforts, including close air support and interdiction, as it provided strategic, operational, and even tactical intelligence.

'Y' operators, however, required a great deal of training and experience to function effectively. For example, 'Y' units dealing with wireless telegraphy (W/T) "demand[ed] a sizeable, highly skilled team whose training and experience need to have been extended over a period

7 Ibid., p.64.
of at least one year before any reliable intelligence [could] be expected from them." The majority of Axis high-grade codes and cipher traffic employed W/T, and thus the success of efforts against this traffic started with the proficiency of 'Y' units. Radio telephony (R/T) interception units, conversely, were smaller, because the material being handled was short-range voice transmissions of a short-term nature, and "codes used [were] comparatively simple and [could] be immediately exploited by linguists who [had] undergone the shorter period of training required."  

The British organization of 'Y' was initially primitive and less well organized than its German counterpart, but by 1942 it had become more complex and integrated into operational planning to a point where it could aid close air support operations. During operation 'Compass' in December 1940, one main station functioned for the RAF. This was a W/T station located in an old Museum building at Heliopolis, and incorporated Nos. 50 and 53 Wireless Units. Also housed in this building was a small Army establishment of two smaller units; one unit dealt with Italian communication, and was later augmented by a similar unit dealing with German Army communication. The commanding officer of these two army formations was also in charge of the Combined Bureau Middle East, essentially a satellite of Bletchley Park.  

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8 PRO AIR 40/2252 Mediterranean Air 'Y', 18 September 1943, p.2.  
9 Ibid.  
During 1940, army field 'Y' consisted of No.2 Special Wireless Company, along with reinforcements from India. The total of 80 men were organised into four mobile sections, each containing three receivers. Before Rommel's first offensive in early 1941, only one mobile section covered Cyrenaica, with intermittent assistance by the two units in Cairo. Lack of experience and poor C^3I systems degraded the operational usefulness of 'Y' intelligence until mid-1942, by which time these problems had been addressed, and 'Y' had become a central feature of RAF/Eighth Army operations in the desert.

Signals intelligence was not the only source for strategic intelligence. The work of the Long Range Desert Group (LRDG), formed in June 1940 and consisting initially of volunteers from the New Zealand Division with British officers in command, provided operational and strategic intelligence and undertook hazardous missions well behind enemy lines. Throughout the campaigns in the Western Desert and Tunisia, this force provided reconnaissance on enemy movements and standard procedures, rescued Allied airmen and prisoners, provided wireless links with other forces, prepared advanced landing grounds, planted misleading information, and provided detailed information on terrain which aided in selecting routes of advance. Indeed, in 1943 the

\[11\] WO 208/5077, GSI (s) to DDMI (I), 14/2/41; WO 208/5021, Military 'Y' Mideast, GSI (s), 2/3/41; Clayton, p.151.
LRDG guided the New Zealand Division around the Axis flank “during their ‘left hook’ operations at El Agheila and again at Mareth.”

A third important source of strategic intelligence was the interrogation of prisoners of war. This practice is one of the oldest forms of intelligence, and was the only source of intelligence that could consistently show the effect of both interdiction and close air support on enemy morale. Signals intelligence only supplied indirect evidence on such matters, because they were rarely communicated. Prisoner of war interrogations also provided an admirable means of reconstructing the enemy’s organization and standard operating procedures, and of gathering technical intelligence. For example, British interrogators were asked to determine the speed of German U-boats when submerged. Although a captured U-boat Captain initially lied to the interrogator, stating that the maximum speed was ten knots, a recorded conversation between the U-boat Captain and another prisoner revealed, “actually eight was the maximum.”

Interrogation of prisoners of war fell broadly into three main categories beginning with interrogation in the field for “information of immediate tactical value.” This consisted of identification of a prisoner’s unit, probing the prisoner for information on his unit’s objectives and

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12 IWM, Papers of Major General Lloyd-Owen, LRDG 1/7.
13 WO 208/4193, CSDIC Interrogation Reports, I/S R.X. 13 Information received in UK on 10 September 1941.
14 PRO WO 208/3478 The Interrogation of Prisoners of War, March 1943.
intentions, and the preparation of reports documenting information given by the prisoner to be used during the detailed interrogation. The next category was the detailed examination of selected prisoners to obtain operational and strategic intelligence for General Headquarters' requirements. The final category was the long term "strategical and technical examination of selected prisoners which [was] designed to obtain information required on a War Office or U.S. War Department level."\(^{15}\)

In August 1940, the *ad hoc* arrangements for interrogation ended with the establishment of a Combined Services Detailed Intelligence Centre (CSDIC) at Maadi, some six miles from G.H.Q., Middle East.\(^{16}\) Intelligence officers from all three services were attached to the CSDIC, which was a copy of the one in London, to extract intelligence from prisoners. The objectives of the centre were to record conversations between prisoners through carefully concealed microphones (referred to as 'X' intelligence), and to carry out direct interrogation. For these purposes, the CSDIC in Cairo was divided into three identical huts, each with an exercise area, but one of the huts was "bugged" so intelligence officers could eavesdrop on prisoner conversations.\(^{17}\) The "bugged" hut was wired to the Operations Room, which was a series of rooms each

\(^{15}\) Ibid.
\(^{17}\) AWM 54(423/4/24) Notes on the CSDIC, Cairo, Middle East, 1941, p.1; PRO WO 208/3248 Notes on CSDIC Mediterranean, undated, Part 1.
with a listening table connected to a microphone. The process of listening to and recording prisoners’ conversations was tedious, and watches were limited to two hours.\textsuperscript{18}

The huts each held twenty prisoners, though there were rarely more than a total of thirty at any time.\textsuperscript{19} The average length of time spent at CSDIC was six days, after which prisoners were transported to permanent camps. The standard procedure was to accommodate new prisoners alone in their cells until the initial interrogation, after which they were “paired off with either the object of listening-in to the prisoners’ conversation or with a stool pigeon primed with the information required from the prisoners.”\textsuperscript{20} Stool pigeons were prisoners who, in exchange for cooperation, received a sum of two pounds a week and aliases to protect their true identities.\textsuperscript{21} The RAF made considerable use of stool pigeons, but not the army. Air prisoners tended “to be more security conscious” and thus stool pigeons were a useful supplement to regular interrogation.\textsuperscript{22} However, security checks using hidden microphones were made to ensure the loyalty of these individuals, and on “several occasions a stool pigeon was found to be a double agent.”\textsuperscript{23} The establishment of this centre was an important first step towards effectively exploiting this intelligence

\textsuperscript{18} AWM 54\{423/4/24\} Notes on the CSDIC, Cairo, Middle East, 1941, p.2.
\textsuperscript{19} Ibid., Hinsley, I, p.205.
\textsuperscript{20} AWM 54\{423/4/24\} Notes on the Combined Services Detailed Interrogation Centre, Cairo, Middle East, 1941, p.2.
\textsuperscript{21} Ibid.
\textsuperscript{22} PRO WO 208/3248, Notes on CSDIC Mediterranean, undated, Part 1,p.7
\textsuperscript{23} Ibid.
source, but it would not be until ‘Crusader’ in November of 1941 that improvements would be made to the structure of the system for exploiting this important intelligence source. By this time, intelligence staffs had gained valuable experience with this source, enabling them to utilize it more fully.24

The most valuable sources for operational intelligence quickly proved to be photographic and visual reconnaissance. Tactical and strategic reconnaissance located targets and aided in an understanding of the enemy’s standard operating procedures. Photographic intelligence provided damage assessments of RAF raids, and aided in target location when procedures were instituted for rapid assessment and dissemination of intelligence. Moreover, the RAF made use of reports from aircraft engaged on other missions to augment their reconnaissance, but the reports were not as good as from trained reconnaissance pilots. However, it was not until the summer of 1942, that these efforts were coordinated. Until then, aerial reconnaissance remained uncoordinated and inefficient as both the RAF and British ground forces controlled their own reconnaissance units. The result was a costly duplication of effort. Moreover, in 1940, there was no serious provision for the acquisition of photographic intelligence useful for operations. The “photographic cover [that] was obtained was interpreted by untrained ALOs and intelligence

24 For an understanding of the requirements for effective interrogation see Toliver, op. cit.
officers at GHQ Middle East. In December 1940, a RAF Photographic reconnaissance interpretation section arrived at RAF headquarters to deal with RAF interpretation, but they were only detailed to interpret the static defences at Bardia and Tobruk.

Access to strategic intelligence through the exploitation of enemy signals communication was important for planning major offensives, but intelligence was not in a position to aid British operations in a consistent fashion. Intelligence staffs were inexperienced, and there was no attempt to coordinate intelligence received from various sources to maximize their effect. Moreover, even if this had been done, the cumbersome command structure and unreliable communications would have rendered much of it useless.

In 1940, combat troops on the frontier of Egypt were organized into a formation known as the Western Desert Force under the command of Lieutenant General Richard O’Connor. Prior to the attack on Bardia on 3 January 1941, this formation was renamed XIII Corps. At the same time an unnecessary command level, British Troops in Egypt (BTE) commanded by General Sir Henry Wilson, was interposed between XIII Corps and GHQ Middle East. This new command structure caused problems for O’Connor, who received contradictory orders on several occasions. For example, on 25 January, O’Connor met with Wilson to

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26 Ibid.
discuss the possibility of "a proper advance [being] carried out instead of a raid" on Benghazi. Subsequently, however, O’Connor “received a number of telegrams from HQ BTE in Cairo indicating that no arrangements were being considered for an advance of any sort on Benghazi,” because of the risk of losing what had been gained. O’Connor was confused as this was completely at variance with Wavell’s ideas on the subject, which had been communicated without Wilson’s knowledge. O’Connor contacted HQ BTE for an explanation, as he “found it difficult to carry on with two different policies”. He felt that in future he “should work directly under GHQ owing to the difficulty of HQs BTE exercising control outside the frontiers of Egypt.” The cumbersome command structure, which was often circumvented by Wavell when convenient, resulted in confusion on the ground that would have proven disastrous against the German army.

The general relationship between the army and air forces in the Western Desert remained relatively constant between 1939 and 1941. The only air assets not under the direct control of the RAF were the Army Co-operation squadrons that provided corps headquarters with tactical reconnaissance, and during operations could be sub-allotted under leading

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27 LHCMA General Sir Richard O’Connor’s papers 4/3/1, An Account of Various Events Written by General Sir R.N. O’Connor whilst a prisoner of war in Italy May 1941; PRO CAB 106/685 Letter Regarding Difficulties Encountered While Commanding 13 Corps 1940/41.
28 LHCMA General Sir Richard O’Connor’s papers 4/3/1, An Account of Various Events Written by General Sir R.N. O’Connor whilst a prisoner of war in Italy May 1941.
29 Ibid.
30 Ibid.
divisions. While Army Co-operation Squadrons "...act[ed] in close co-operation with corps H.Q. and [were] under army control" it was the responsibility of the commanding officer of the Advanced Wing to advise the army commander on their employment. The rest of the RAF operated as an independent entity. Yet in practice, both services had to co-operate closely, and operations were often planned to improve the position of the other. The course of land fighting often turned on air support, and success or failure on the ground determined the placing of forward air bases.

Prior to the entry of Italy into the war, No. 208 (Army Cooperation) and No. 33 (Fighter) Squadrons were detailed to provide close support to the army. These aircraft were initially to be operationally controlled by 253 Wing, but immediately before Italy’s entry into the war this unit was disbanded and its equipment and personnel absorbed by 202 Group. Operational control of close support aircraft was exerted by "a small Air Liaison Section consisting of 1 Group Captain and1 Squadron Leader" at headquarters Western Desert Force, and was the first instance of a joint army RAF headquarters. This method of control proved successful because of the limited operational front and "the absence of any

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32 PRO AIR 23/6478, Battle of Cyrenaica 41/42, Notes on Fighter Organisation and Control.
administrative responsibility connected with the units." Other bomber and fighter squadrons were detailed for close support as required.

The general organization within the RAF in the Mediterranean area also changed significantly early in the war. For instance, in the operational plans produced by HQ RAF Middle East in 1939, the strength to be allotted for each role of the RAF was to be determined by the Air Officer Commanding-in-Chief, RAF Middle East. However, because of the huge area of responsibility which RAF Middle East encompassed, "the actual operations and choice of targets [was] to be the responsibility of A.O.C. Egypt Group" (later No.202 Group). Similarly, the ancestor of the Western Desert Air Force was Air Headquarters Cyrenaica, formed at Barce on 25 February 1941. This formation was renamed 204 Group on 12 April 1941, and on 9th October 1941 became Air Headquarters, Western Desert.

Opposing the RAF was the Regia Aeronautica, which had a considerable advantage in overall numbers of aircraft in the Mediterranean, but failed to make effective use of them. The figures for numbers of aircraft vary greatly, but the most accurate assessment shows that the Italians had 313 aircraft of which roughly half were serviceable at any time. Against this, the RAF had 205 serviceable

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34 Ibid.
35 Denis Richards, I, op. cit., p.409; PRO AIR 25 index under 202 Group.
36 PRO CAB 106/626, Air Chief Marshal Sir Arthur Longmore, Air Operations in the Middle East, 1 January to 3 May 1941, p.3.
37 Ibid.
aircraft in June 1940. The Italians, however, had over 1000 more aircraft in Italy that could have been called upon to support operations, but were not.\footnote{Terraine, op. cit., pp.310-311.}

When the Italians advanced on 13 September 1940, the British army offered little resistance, and instead retreated to the prepared defences at Mersa Matruh. This location was chosen largely due to it being the terminating point of the railroad, allowing the easy delivery of supplies. However, it was not planned "that the defence should be a passive one", and on 21 September General Wavell issued orders "for a counter-stroke to be prepared against the enemy, so soon as he became engaged with the defences of Matruh."\footnote{CAB 106/918, Despatch on Operations in the Western Desert From 7 December - 7 February 1941, by General A. P. Wavell, p.1; PRO WO 169/16, Operations in Western Desert October to December 1940 (Notes on Genesis and Working Out of "Compass" Plan), p.3.}

Reflecting typical RAF views, air support during the retreat to Matruh consisted largely of reconnaissance, "but also called for the bombing in conjunction with attacks by ground troops of enemy strong points threatening a safe withdrawal of British forces from the frontier."\footnote{AHB, Air Support, op. cit., p.48.}

The Italian army did not attack the British position at Matruh. Rather, they dug in near Sidi Barrani, some eighty miles to the west, and showed no interest in further advance. Despite his serious numerical disadvantage, Wavell began to "consider the possibility of an early offensive action" to take advantage of the faulty defensive arrangements...
of the Italian army. Its defences consisted of a series of camps between Maktila and Sofafi, which were not mutually supporting and lacked depth.

In conjunction with Wilson and O’Connor, Wavell planned for an early offensive code-named operation ‘Compass’. The battle plan called for the Support Group of the 7th Armoured Division to prevent the enemy forces in the camps around Sofafi from intervening in the battle. Meanwhile, the remainder of the 7th Armoured Division and the 4th Indian Division were to pass through a gap between the Nibeiwa and Sofafi camps, thus cutting the Italian defences in two. A brigade of the 4th Indian Division with the 7th battalion R.T.R. was then to attack Nibeiwa camp from the west, while the Armoured Division covered the attack and prevented any intervention from the enemy to the north. After Nibeiwa camp was captured, the Tummar group of camps was to be attacked from the west, again supported by armour.

The qualitative difference between forces, combined with the relatively high degree of motorization of the British army, allowed the British to run the operations according to plan, and all objectives were taken quickly with very little loss. Even with a fragile C³I structure, the British forces were able to complete the ‘Boyd’ loop far faster than their

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41 PRO WO 169/16, Operations in the Western Desert October to December 1940 (Notes on Genesis and Working Out of ‘Compass’ Plan, p.3.
42 Ibid.
Italian opponents. This success was extended by the decision to press on and seize Sidi Barrani. The 7th Armoured Division was employed to prevent the escape of forces at Sidi Barrani, while the 4th Indian Division attacked it. The situation “at nightfall on 10 December was that Sidi Barrani had been captured and the 2nd Libyan and 4th Blackshirt Divisions destroyed.” The remaining enemy forces quickly withdrew to Bardia, but the initial campaigns had seen the destruction of five divisions, with 38,000 prisoners, over 400 guns and 50 tanks. British casualties were only 133 killed, 367 wounded and 8 missing.

The attack on Bardia was delayed for sixteen days to allow for the arrival of supplies of ammunition from the railhead at Mersa Matruh. The plan called for the 6th Australian division (which had replaced the 4th Indian division) to attack a point west of Bardia, seizing a bridgehead and allowing engineers to fill in the anti-tank ditch circling the perimeter. Once this was accomplished, the tanks were to drive into the perimeter to the southeast and prevent the escape of the garrison, while the 6th Australian division continued the assault. On 3 January 1941, the attack began, and, like the previous battles, ended quickly with few British losses. By 1745 hours January 4th, the Italian forces in Bardia had

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44 PRO CAB 106/918, Despatch on Operations in the Western Desert From 7 December 1940 to 7 February 1941 by General A. Wavell, p.7.
45 Ibid.
surrendered. The British netted some 45,000 prisoners, 462 guns, 117 light, and 13 medium tanks.\textsuperscript{46}

These dramatic successes were due to the planning, secrecy, and execution of operation 'Compass', and the qualitative inferiority of the Italian Army to that of the Western Desert Force and the RAF. Problems with C\textsuperscript{31} systems did not enable the RAF and army to co-ordinate their efforts much beyond the planning stage against targets which were fixed and easily located, and where the position of British troops was well known. The difficulty in responding to calls for support lay in inefficiencies in command structures and communications, as well as a lack of suitable aircraft, but the impact of the pre-arranged attacks was quite dramatic.

During the attacks on Sidi Barrani, Bardia, Tobruk, and Benghazi, the RAF's heavy bombers were to attack military objectives by night, giving the enemy troops no chance to rest. Medium bombers were "employed in a similar role to the heavy bombers both by day and night and at other times attacked enemy aerodromes."\textsuperscript{47} Fighters were used for fighter defence over British troops, to provide reconnaissance, and "to make low flying attacks on mechanical transport on the enemy's lines of communication."\textsuperscript{48} The advantage of air support was that it kept the

\textsuperscript{46} PRO WO 169/1107, War Diary of XIII Corps, Intelligence Summary No.8 for 8-9 January, 1941.
\textsuperscript{47} RAFM Papers of Air Chief Marshal Sir A. Longmore DC 74/102/14 Despatch by Air Chief Marshal Sir Arthur Longmore, p.1.
\textsuperscript{48} Ibid., p.2.
pressure on a demoralized Italian army while heavy artillery was moved forward.

An aerial assault on Bardia preceded the army’s ground assault. On the night of 1 January, following a series of similar attacks, Wellington and Bombay bombers dropped “over 20,000 lbs. of bombs on enemy defences and troop positions.” This attack was continued during the day by Blenheim medium bombers, followed by another night assault that dropped a further 30,000 pounds of bombs on Bardia. The total load of bombs dropped during these operations “amounted to over 40 tons.” Although the bombing accuracy often left much to be desired, the effect of this constant attack took an enormous toll on the thin veneer of Italian resistance. During these operations, weaknesses in the C^3I systems of both the RAF and army prevented the application of consistent close air support, especially when forces were engaged in battle, few aircraft were available to do so, and tactics had not evolved to maximize the effect while minimizing losses. Despite this, RAF close air support worked.

The targets were subjected to intense and constant attacks, which “caused great disorganization, mainly through [their] moral effect.” The overall effectiveness of RAF close air support was magnified because of the lack of morale of the Italian army. For instance, during the attack on Fort Capuzzo, an RAF raid in which no bombs landed inside the target

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49 Ibid.
50 Ibid.
51 Richards, I, op. cit., p.273.
area induced the garrison to surrender. Some of the roughly 45,000 prisoners from the Sidi Barrani offensive were interviewed about the results of RAF bombing attacks. Responses showed that “it had caused great disorganization, mainly through its moral effect.” A similar story can be told of RAF bombing before the assault on Bardia. A senior Italian prisoner of war said that the “RAF had harassed the defending units by day and night, robbing them of sleep and reducing their morale until when the assault came...they were reduced to a state of utter helplessness.”

However, even here the British C^l system showed problems that would prove costly against the Wehrmacht. Against the Italian army that was unable to react quickly to British attacks, these difficulties did not surface to any great degree, but there were instances when British losses were suffered as a result. For example, during the battle for Sidi Barrani, 202 Group headquarters was situated alongside the advance headquarters BTE, 110 miles behind the battle area, and its aircraft were employed in bombing and strafing attacks. XIII Corps headquarters requested to be permitted to control air action in the tactical area so aircraft could be directed as accurately as possible. This request was refused, and confusion in the transmission of orders from XIII Corps through HQ BTE

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52 PRO AIR 41/44 Operations in Libya & The Western Desert September 1939-June 1941, p.35.
53 Richards, I, op. cit., p.273.
to No. 202 Group resulted in an attack on friendly troops by RAF Hurricanes.\textsuperscript{55}

Thus, providing tactical intelligence to pilots to ensure they hit the target and not British troops proved to be as valuable as operational intelligence. To this end, attacking aircraft could be directed to the target from either the ground or from the air. In the latter case, they would rendezvous with reconnaissance aircraft, which then led them to the target. This required excellent coordination between Army Air Support Control (AASC), the Air Officer Commanding Air Headquarters, Western Desert, and the RAF squadron involved. This often proved impossible. During ‘Compass’, the AASCs were \textit{ad hoc}, consisting of one Australian and one New Zealand unit commanded by a British officer.\textsuperscript{56} But pilots still had difficulty in identifying friendly and enemy forces. Once over the target, pilots looked for identification signals from those troops, and responded in turn. Several methods were attempted, but no complete solution to this difficult task was ever found. Indeed, even in recent conflicts casualties have been inflicted through “friendly fire”, and such incidents remain a battlefield reality.

Initial attempts at providing attacking aircraft with tactical intelligence from the ground were similar to those developed during the fighting on the frontier of India and air control operations between the

\textsuperscript{55} PRO WO 169/1107, Report on Army Co-operation Carried out In Connection With the Land Operations in the Western Desert and Libya, 31/1/41, sheet 8.

\textsuperscript{56} PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, p.45.
wars. In 1939, the procedure was for attacking aircraft to drop one or more practice bombs in the area in front of the ground forces", who were to fire a Verey light of a prearranged colour in response. The aircraft would then reply by firing two Verey lights of their own. At night, the procedure was the same except that aircraft were to drop one or more flash bombs. It was agreed that if the ground units did not respond within one minute, the pilots were to assume it was hostile and attack. These methods proved to be too unreliable and time-consuming, and changes were instituted before the ‘Crusader’ offensive in November 1941.

Communication difficulties also degraded the extent to which impromptu close air support could function. The standard allotment of radio sets in the British army of the time was for Corps’ headquarters to have two or three radio sets, and Army headquarters between six and nine. Often Corps headquarters had to command several divisions through one link. British divisions possessed one set each for lateral and rear communication, and one further set for forward communication to brigades. Brigades had one link to battalions or armoured regiments, but battalions had no forward links at all, although armoured car squadrons, artillery batteries, and tanks were equipped with radio. During the Sidi Barrani offensive in 1940, the 4th Indian Division had only one unreliable

59 Ibid.
radio set to handle all its administrative traffic.\[60\] Although this system sufficed against the Italian army, the aggressiveness and tactical competence of the Afrika Korps would shatter it.

Even against the Italian army, difficulties arose through technical faults with equipment, and the poor signals discipline of British units. For example, O'Connor's headquarters lost touch with Selby Force, garrisoning Mersa Matruh, because this unit changed frequencies when it could not communicate with O'Connor's headquarters. Compounding the problem, the frequency Selby Force switched to was being used by 4\textsuperscript{th} Indian Division, making it impossible to communicate with either formation, or even locate them.\[61\] The RAF was almost totally out of the 'military picture' once forces became engaged, and during the initial assault when the enemy was withdrawing in the face of increasingly heavy bombing attacks, it was difficult for Air Headquarters to locate friendly ground forces. Indeed, often "the first indication of the position of Army formations" came when they called for air support.\[62\]

The RAF's communication system experienced similar growing pains, if on a much smaller scale than those of the army, which relied more heavily on radio. The RAF, conversely, relied to a larger degree on landlines for communication, because the Air Staff held that

\[60\] PRO WO 201/353, Memorandum from the 4\textsuperscript{th} Indian Division on operations November-December 1940.
\[62\] AHB, Air Support, op. cit., p.49.
communication between fighter and bomber wings and their squadrons should be primarily based on “using D.8 cable on the ground, and that Fighter Wing Headquarters would also be within D.8 distance of Advance Air Headquarters.”63 In order to keep up with mobile operations, Air Formation Signals laid D.8 cable between Wings and their squadrons, as well as between Wings and Advanced Air Headquarters, after every move forward.64

The RAF did not rely solely on landlines for communication, as they had weaknesses just as radio did. The practice of “MT traffic following signal lines in order to be assured of arriving at their destination” combined with desert conditions forced line maintenance parties to work continuously to keep the lines in working order.65 For example, during the ‘Crusader’ operation, line maintenance parties working twenty-four hours straight still “found it difficult to keep the lines in working order.”66 Unless land-lines were kept in optimum condition, they “cause[d] exhaustion to vocal chords,” and messages could be misunderstood with disastrous results.67 These lines also tended to become overloaded by administrative traffic. This problem was not overcome until February 1942, when it was “found necessary to provide

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64 Ibid.,p.4; PRO AIR 23/1344, memorandum from the Chief Signals Officer to the Air Officer Commanding-in-Chief, Middle East, 13 April 1941.
67 Ibid.
separate channels of communication and organizations for operational, administrative, 'Y', and air reinforcement route services.”

Just as wireless operators needed to be highly skilled, so did those handling landline communications. Where this ability existed, the “telephone saved a considerable amount of signalling, especially to the Fighter Wings, and so improved the facilities for co-ordination between Bombers and their Fighter escorts.” In the absence of such ability, relayed messages were found to be “most unreliable” because of errors committed by the operators. With such extensive W/T links, both services needed good equipment and skilled personnel. Until such prerequisites existed, the RAF was unable to respond quickly to calls for support, and pre-arranged air support was all that could be expected.

Aided by the ability of the RAF to continue the assault on retreating Italian forces by day and night, the British advance continued through Tobruk and Benghazi to El Agheila. General O’Connor wanted to continue the advance through to Tripoli, but was met with resistance from the Prime Minister, the Secretary of War Sir Anthony Eden, and Wavell, who were hoping to check German incursion into Greece, Crete, and the Balkans. This type of political interference at the expense of military operations was a common feature of the campaigns in North Africa,
eventually claiming the commands of both Wavell and Auchinleck, and resulting in the erosion of British military and air strength. By this stage, however, the British forces were nearly exhausted, but the decision removed the possibility of further advance.

On 20 January 1941, the policy for continuing operations was spelled out in a War Cabinet Defence Committee meeting. The priorities were to clear “Cyrenaica and secure Benghazi...[then] Cyrenaica could be held with a comparatively small force, thus freeing the greater part of the Army of the Nile, and our air force in the Middle East, for action elsewhere.” With this decision, the British advance was halted, its air and land strength was weakened by the removal of “the New Zealand and the 5th Australian Divisions, an armoured brigade, corps and reserve troops, and 10 RAF squadrons” in the attempt to aid Greece against a German advance. This was particularly troubling for the RAF, which was suffering from a serious shortage of suitable aircraft for operations.

During ‘Compass’ Air Chief Marshal Sir Arthur Longmore, the commander of RAF Middle East was concerned over the lack of RAF aircraft in the Middle East, and the difficulty in maintaining serviceability. In early 1941, Prime Minister Winston Churchill, equally disgusted with

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73 LHCMA, Papers of General Sir Richard O’Connor 4/4/1 War Cabinet Defence Committee (Operations), 20 January 1941.
74 PRO WO 106/2270, Military Intelligence Service, War Office, Notes and Lessons on Operations in the Middle East, January 30th 1943, p.5.
75 Terraine, op. cit., pp.301-318.
the RAF's own poor serviceability rates, sent Air Vice Marshal G.G. Dawson to organise the maintenance facilities and improve the situation. Dawson became "Chief Maintenance and Supply Officer with the job of receiving, modifying, distributing, salvaging, and repairing the aircraft and spares in the Middle Eastern Air Command." Dawson focused on two distinct issues, repairing battle damage and recovering downed aircraft. Each approach saved thousands of aircraft for the RAF. Air Marshal Tedder was very impressed with this organization, whose real effect would be felt in 1942, especially the "much improved...rate of serviceability". Between May and November 1941, the number of serviceable aircraft rose from 200 to nearly 600, and although some of this was due to increased reinforcements, Dawson's work was a major factor in preserving these numbers in combat-ready condition. The Luftwaffe and Regia Aeronautica had typical serviceability rates of just over fifty percent throughout the campaign, whereas RAF rates were typically as much as thirty-five percent higher.

However, despite increasing numbers of serviceable aircraft, the methods of delivering close air support that had proven successful against the Italian army were to prove wholly inadequate against the fast-moving,
qualitatively superior German army. These forces began to arrive in January 1941, and were advancing by the end of March.

With the arrival of German forces, Ultra became the best source of strategic intelligence. It was invaluable for planning major operations, for determining strategy for the theatre, and for interdiction on the Mediterranean, but only when intelligence staffs had the proper experience for dealing with it. Ultra intercepts did help the British to understand how the war on supply (both on land and at sea) was affecting the morale and fighting ability of the Axis forces, as well as helping to predict forthcoming enemy offensives where close air support would be required. Ultra noted the arrival of these forces, but "intelligence reports from Italy and Libya were so scanty and so few aircraft were available for reconnaissance that [the British] remained very much in the dark as to the enemy's real strength or intentions." 80

Intelligence staffs were still inexperienced, and were for some time unable to predict accurately Rommel's intentions or capabilities. Compounding the problem, the success of Ultra against the German army's Enigma varied over time. 81

Through 1941-42, most Luftwaffe traffic and some Italian naval traffic were being read, but German Army traffic was only regularly

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81 Bennett, op. cit. Initially, the term Ultra referred to information gained through breaking the Enigma, and later the Geheimschreiber, cipher. Later in the war, the term Ultra was expanded to include the decryption of high-grade ciphers of whatever source, German, Italian, or Japanese.
vulnerable from May 1942 onward. Hence, Ultra always provided a good picture of enemy supplies entering North African ports and of the Luftwaffe’s disposition, serviceability, and capabilities, but it was not until the ‘Gazala’ operation that Ultra provided much consistent material on the German Army. This information let the RAF focus its reconnaissance aircraft in areas where enemy activity was expected, and the need for air support likely. Knowledge of the battlefield and how operations were likely to unfold increased the ability of the RAF to provide such support more easily and cost-effectively. This ability improved as access to German army Enigma improved.

Ultra had little operational use for close air support operations. It could not be used to guide aircraft onto targets, despite the fact that Ultra intercepts often contained operationally useful information. The difficulty came through the delay in the transmission of decrypts from the GC&CS to the appropriate Middle East commands. Initially, the intelligence selected by GC&CS was paraphrased before it was signalled via an RAF W/T link to Cairo. This took the form of a prefix that was changed every 9,999 signals, and by a sub-prefix for individual addressees. When this information arrived in Cairo, the director of Combined Bureau Middle East distributed it to a very limited number of recipients in the three services. Ultra’s usefulness to Middle East commands was initially limited by the
delay imposed by these security procedures and the inexperience of GC&CS personnel. The delay was made worse by reluctance in intelligence branches in Whitehall to allow GC&CS to select the information transmitted to the Mediterranean. This reluctance had faded by February 1941, when experienced intelligence officers were posted to GC&CS to amplify, to modify, and to comment on GC&CS' signals. More serious was the lack of wireless channels to the Middle East, but this had been dealt with by the middle of 1941.

With experience, 'Y' personnel were able to determine the enemy's order of battle and location with surprising accuracy. They also served to locate individual enemy aircraft that were out of radar range, thus preventing them from threatening RAF aircraft, as well as tracing patterns of air operation. 'Y' was of particular value in "mobile warfare in which locations and conditions [were] continually changing and information about the enemy [was] consequently becoming out of date almost daily." As with Ultra, British 'Y' was hampered by a lack of experience that on occasion affected its ability to provide reliable intelligence. On 5 May 1941, for example, RAF 'Y' noted that Lt. Gen. Romniel was the commanding officer of the newly arrived German forces. However, in the context of increasing familiarity with the enemy's organization,

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84 Ibid., p.570.
85 PRO AIR 23/1209 Intelligence Organization-Mobile Fighter Group, 31/5/43.
86 PRO AIR 40/2342 'Y' Service report, 5 May 1941.
procedures, and personalities, largely provided by Ultra and prisoner interrogation, the value of ‘Y’ increased dramatically.

The ability to confirm and enhance intelligence from one source through that obtained from another source also came with experience. However, where reconnaissance could have made up for the lack of army enigma on the disposition and capability of German forces, this source was plagued by its own difficulties. Chief among them was the hazardous nature of these missions due to the enemy's air force and anti-aircraft defences. Local air superiority was necessary for effective reconnaissance. Where fighter escort was not available, reconnaissance sorties were often cancelled, and operations that relied heavily on reconnaissance were degraded. Even well armed reconnaissance aircraft were vulnerable, since their pilots were absorbed in looking at the ground for targets instead of scanning the sky for enemy aircraft.

Equally detrimental to reconnaissance efforts was a lack of suitable equipment and poor coordination between units engaged in this activity. For example, the commander of Cyrenaica command (the command established after the capture of Benghazi and El Agheila) had on average only 3 Hurricane sorties daily for tactical reconnaissance, and at one time had no aircraft capable of photographic reconnaissance. Moreover, broadcasting the results of reconnaissance missions was problematic.

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87 PRO AIR 23/6482 Signal from 253 Wing to 268 Wing, 3 November, 1941; NAM, Papers of Lt. Gen. Cunningham, Memorandum entitled What We Ask of the Air, undated.
because of difficulties with the high-frequency (HF) radio band.®® Despite the increased number of frequencies with the HF band, other characteristics degraded its usefulness under some operational conditions, as illustrated in a wireless exercise conducted on 12/13 August 1941. This reported R/T range at “up to 100 miles...between No.23 sets using good aerials and No.9 sets using vertical rod aerials, provided that the frequency chosen [was] fairly interference free.”®° This performance was achieved during the day only. Experience proved that interference experienced in the Western Desert was worst during the hours of darkness on frequencies “between 2000 kc/s and 6500 kc/s. Except in cases of dust storms interference of a static nature is seldom experienced on any frequencies during the hours of daylight.”®¹

This interference was experienced by both R/T and W/T using HF, and a great deal of practice was required to change “from day to night frequencies and vice-versa when fading [took] place.”®² The Chief Signals Officer of the R.A.F. Middle East, Group Captain W.E.G. Mann, indicated that “the aircraft R/T set in use, the T.R. 9D, worked on H.F., with a rather noisy background and a poor range in comparison with the distances over which our aircraft were called upon to operate,” and that really “effective ground control of these aircraft was not possible during

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®¹ Ibid.
1941. These technical limitations created serious operational consequences, as once aircraft moved outside the range limit or the interference became too great, they could not receive updated tactical intelligence or be vectored onto targets. Moreover, tactical “reconnaissance R/T reports during flight were rarely made, partly on account of the poor performance of the T.R. 9D wireless equipment and of the even less adequate ground stations associated with it.” In early 1942, it was recommended that the Collins No. 18M be adopted in lieu of the No.9 and No.11 sets because of their poor performance. The problems associated purely with the radio set were reduced with the introduction of the Collins 18M, but those related to the frequency band could not be overcome. In late 1940, very high frequency (VHF) radio sets were brought into use in England, but their introduction into the Middle East was delayed until mid-1942. At roughly the same time, reconnaissance was reorganized to fulfil its vital role in tactical air operations.

Thus, British C³I systems had far to go before they would be able to control close air support operations. Moreover, RAF pilots had yet to receive sufficient numbers of aircraft suitable for damaging air support missions. Despite these obstacles, close air support had proven its worth

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93 PRO AIR 40/1817 Signals Appendix for Lord Tedder’s Despatch on Middle East Operations, May 1941-Jan. 1943.
94 Ibid.
95 Ibid.
96 Ibid.
against the Italian army. However, with the arrival of German forces, the weaknesses in the British C^3I systems would become quickly evident. Indeed, the British were surprised at the speed and competence of the German forces.

Therefore, with a somewhat sketchy picture of the German disposition, Wavell was convinced “that an enemy attack was unlikely before the middle of April 1941 at the earliest, and [he] hoped it might not take place before May,” by which time the strength of the forces in Cyrenaica would be increased.® This failure to accurately predict the timing of Rommel’s offensives was a serious and continual problem for the British. In addition, signals insecurity and confusion often resulted in a paralysis of command during the fluid operations against the Afrika Korps. This, in turn, prevented the smooth application of air support, as orders and intelligence were unable to flow with sufficient speed.

With only one full German division, which included one Panzer regiment, Rommel began his offensive on the 24 March 1941, and immediately forced the retreat of the British forces.®® During the retreat, ground units often lost contact with each other and with the air units providing support. This confusion led to false deductions being made “from air reconnaissance reports with grave results for the retreating forces” in the form of attack by friendly aircraft, pointing out the need for

a more efficient C^l system, including a better means of air-ground recognition to avoid friendly fire casualties. The need for these improvements was very evident in the early battles against the Axis forces.

Apart from operation 'Brevity', the abortive offensive using Ultra intelligence, the first British operation against the combined Axis forces was operation 'Battleaxe', in June 1941. The purpose of this offensive was to relieve the besieged port of Tobruk and recapture the airfields in eastern Cyrenaica. To give as much air support as possible to the ground forces, Tedder stripped the rest of his command of every available aircraft. Even with most of the RAF’s strength involved in the battle, however, it was too weak to make much of a difference. Moreover, Major General Sir Michael O’Moore Creagh, commander of the 7th Armoured Division, had misgivings about the potential for the success of 'Battleaxe', as the "whole operation was staged in a great hurry; in fact some of our new tanks had to calibrate their guns on the way to the start line."

Senior RAF commanders understood that the best use of their limited air strength was in an interdiction role. Hence, the RAF’s strength
was focused on attacking road supply convoys between Benghazi and Derna before 12 June, and from 12-14 June on similar convoys between Tobruk and the front.\textsuperscript{103} Despite an understanding of the most effective uses of air power, weakness in the air did not allow the RAF to make much of a difference.

When the offensive opened, on 15 June 1941, the Germans had more than enough shells to make “effective use of the German 88 [anti-tank guns] against the infantry tanks supporting the infantry assault.”\textsuperscript{104} It took only three days for a qualitatively superior German army to blunt ‘Battleaxe’, and drive the British forces back to their start lines. This victory stemmed from excellent command and the superb work of the German 'Y' network that exploited poor British signals security and forewarned the Germans regarding the aims of the offensive, as well as the deployment and disposition of the British forces.\textsuperscript{105} This, combined with the British army’s lack of practical experience in mobile warfare, gave the Axis forces a considerable advantage on the ground.

Even had the British possessed the ability to deliver close air support as they did in mid-1942, the offensive would still have failed. Yet this operation showed that there were many obstacles to be

\textsuperscript{103}PRO AIR 23/1391 Air Operations, 6 June 1941; PRO WO 106/2161 Secret Cipher Telegram from HQ RAF ME to the Air Ministry, Whitehall, 21 June 1941.
\textsuperscript{104}LHCMA, Papers of Maj-Gen Sir M. O’Moore Creagh, G.O.C. 7 Armoured Division, Notes on Desert War, 1941.
overcome before air support could affect the course of the war on the
ground. British aircraft and tactics were as yet unsuited to close air
support operations, there was no adequate system for the control of calls
for air support, C³I systems were unable to keep pace with the battle or
guide aircraft to their targets, and British ground forces were still unable
to stand against the Afrika Korps in a mobile battle. The army still desired
close air support, but the "full measure which the RAF might have given
was not brought to bear owing to a breakdown of ground to air
communication, and later difficulty of locating [British] troops."¹⁰⁶ It took
time to overcome these hindrances.

Many historians have put the success of the Afrika Korps squarely
on the shoulders of Erwin Rommel, and even more has been written about
his abilities as a General. Indeed, much praise is deserved. He was an
inspired leader of troops who often displayed a remarkable grasp of the
tactical situation that enabled him to make the most of fleeting
opportunities, but at the expense of operational success. He frequently
left subordinates to command the Afrika Korps while he led his armour
from the front. This style of warfare allowed the Afrika Korps to
complete the ‘Boyd loop’ much faster than the British and thus exploit
their command problems, but also left Rommel seemingly ignorant of the
true state of his army. Thus, the myth of Rommel as a great army

¹⁰⁶ PRO WO 106/2161, Most Secret Cipher Telegram from The War Office to 29 British Liaison
Staff, Washington, 17 July 1941.
commander was due as much to the unsuitability of the British forces to mobile operations than to his own ability, which was more suited to commanding an armoured Corps than an army. Once the British overcame their \( C^3I \) deficiencies and were able to force the enemy to fight the way they wished, so evaporated the myth of Rommel and the invincibility of the Afrika Korps. However, this did not happen until late 1942.

There were some improvements to the \( C^3I \) systems of the RAF and Eighth army between operations ‘Compass’ and ‘Crusader’. These changes represent the first steps towards creating an efficient system for the application of close air support, which was operating very well within a year of these first steps. It is thus necessary to trace the evolution of the \( C^3I \) systems, and how these changes affected the ability of the RAF to deliver close air support. The speed with which these changes took place owes much to the interwar combat experience shared by Coningham and Tedder. The system they developed became a standard part of the Allied inventory after Tunisia.

The separate but interrelated nature of the army and large portions of the RAF had developed during the previous battles, but there were still difficulties. Winston Churchill formalized this relationship on 7 October 1941, when he ordered that when a battle was expected or in progress the Air Officer Commanding-in-Chief would give the military commander
“all possible aid irrespective of other targets however attractive.”

Thus, in theory close air support was to be the RAF’s main priority. The fulfilment of this directive, however, presupposed good relations between the RAF and army, which was not always the case. For example, prior to the ‘Crusader’ offensive, Lieutenant General Cunningham attempted to gain operational control of RAF aircraft. However, Auchinleck, who realized, as Cunningham later did as well, that RAF resources were insufficient to allow decentralization of control, overruled him.

Moreover, on 4 November Coningham was astonished to learn that Cunningham had not even received his air plan for the operation.

Tedder was also concerned about the competence of the Eighth Army and the consequences of another failure. He wrote that if “the next show goes well and the soldiers do their stuff, then one should be fairly secure for some months, but if they make a mess of it again there is no question at all but that I shall be made a scapegoat.” The British forces still had many systemic obstacles that stood in the way of making the ‘next show go well’.

Even by early 1942, RAF and British army officers required “further training in the use of R/T and the R/T code to ensure security [was] not

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107 John Rylands University of Manchester Library (JRUML), Papers of Field-Marshal Sir Claude Auchinleck, Item 304, Note by the Prime Minister to the Chief of Staff Committee, 29 August 1941.

108 National Army Museum (NAM), Papers of Lt. Gen. Cunningham, 8303-104/17, Despatch on Operations, undated, p.7, also 8303-104/19, Control of Air Forces, 4 October 1941.

109 Ibid., Letter from Coningham to Cunningham, 4 November 1941.

110 Tedder, p.189.
broken. General lack of security such as the tendency to refer to units by Christian names such as “Billy’s Boys” made the reconstruction of British orders of battle a simple matter for the Germans. Also, the RAF did not change their call signs at short intervals and therefore whenever the RAF [had] a W/T set at or near an Army formation HQ, the security of the Army call sign at that station [was] at once jeopardised, and the effort of changing call signs by the Army [was] really wasted.

Repeated German exploitation of poor signals security forced the British to adopt protective measures, but these measures were very slow in coming.

Until the middle of 1942, British communication systems were extremely fragile. Moreover, security measures were found to be time-consuming, and were therefore avoided. For instance, during ‘Crusader’, Cipher traffic often blocked communications and delays became so great that to send any important message by cipher was quite out of the question. One cipher message from 8 Army to 30 Corps marked “MOST IMMEDIATE” took 12 hours before it reached [30 Corps] in the clear. This was due to a flood in messages both at Army and Corps HQs., with which the cipher staffs could not compete.

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112 PRO WO 169/1123, GS 30 Corps War Diary 1941, Notes on First Phase Operations in Libya 18 November – 10 December, 1940.
114 WO 169/1123 GS 30 Corps War Diary 1941 Lessons on First Phase of Ops in Libya 18 Nov-10 Dec 41, p.25.
Poor signals discipline also delayed transmission of information ‘in the clear’. Again, during the most important stages of the battle, the Commander of XXX Corps “was kept waiting a considerable time on the Army Commander’s set at [his] HQ by lengthy conversations, with many repetitions, between Staff Officers of XIII Corps and Eighth Army.” To combat the problems of security versus speed, it was suggested that commanders familiar with each other “can talk a mixture of Urdu and Veiled English, which no enemy can interpret.” Although this suggestion was unsuitable for general use, it did represent an understanding of the problem and a desire to fix it.

Although ‘Crusader’ was marked by communication failures that often paralysed all levels of command, the Eighth army’s communication system was better than it had been in the spring of 1941, and was improving. Until 1942, however, this system, hampered by too few signals personnel and headquarters constantly on the move during operations, was responsible for transmission delays that were measured in hours even for information with a very short life span. However, there were signs of improvement in both the signals personnel and the system. In July 1941, the Air Ministry gave its permission for construction of specialist signals vehicles to begin in the Middle East. They would replace existing vehicles that were “both cumbersome and

115 Ibid.
116 Ibid.
117 PRO WO 169/3904, Eighth Army Main Headquarters Signals, December 1941.
unsuitable for operations in areas where good roads were lacking." They
were found to be too light, too high off the ground, and did not possess
any low-pressure sand tires. Far-sighted measures such as these
proved their worth in late 1942.

Liaison between the services was also improving. At GHQ, beyond
the weekly C-in-C’s committee which dealt with important operational and
administrative questions, daily liaison was maintained by an Inter-Service
Intelligence Staff Conference and an Inter-Service Operational Staff
Conference. In addition, Air force officers were being attached to
division, corps, and army headquarters, and had wireless links to their
own service. They signalled to the RAF any information of interest
coming though army channels. Army officers were attached to air force
units for the same purpose. A great deal rested on the proficiency and
professionalism of Air Liaison Officers, whose value “to disseminate
within the army a knowledge of the work of the RAF”, was understood as
early as 1933. It was not, however, until 1941 that liaison officers
were attached to RAF units other than the Army Co-operation squadrons.
Given the necessity of close cooperation required of the Army and RAF
during mobile operations, the delay in ensuring adequate liaison worked to

118 PRO AIR 40/1817, Signals Appendix for Marshal of the Royal Air Force Lord Tedder’s Despatch
120 PRO CAB 106/535 Operations in the Middle East, 5 July 41-31 October 41.
121 PRO WO 201/488 Appendix B to D.O. Circular No 12. 16 January 1944, also NARA RG 331
Box 43, Reel 71-B, Records of Allied Force Headquarters (AFHQ), Air Liaison Officers’ Course,
Italy 17 May to 2 June 1945.
122 PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, Organisation
and Training of Air Liaison Officers, p.35.
the detriment of both services. The importance of ALOs made it necessary to ensure that “only officers of the right calibre and with proper training [were] employed in these duties.” In theory, constant liaison made it possible to co-ordinate operations and pass intelligence from one service to another with minimal delays, and where this existed operations benefited.

Equally important was the work of the squadron intelligence officer, who was “the funnel through which all branches of intelligence reach[ed] the aircrews.” The squadron intelligence officer presented the available intelligence in a form usable by aircrews, and briefed them before missions about the nature and location of the target. If available, photographs were used to show the target and any known anti-aircraft emplacements. The intelligence officer also debriefed aircrews after the missions, and relayed the results of the missions (including damage estimates, resistance encountered, and losses suffered) to Wing headquarters, Air Headquarters Western Desert, and HQ RAF Middle East. The ALO was present during the debriefing after missions, and would relay relevant information to the army. Thus, a great deal rested on the performance of those who occupied positions in the C^3I structure. However, the chain was only as strong as its weakest link, and frequently

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123 LHCMA De Guingand Papers IV/2/10a 21 Army Group, Some Notes on the Use of Air Power in Support of Land Operations and Direct Air Support, December 1944.
slow communication and uncoordinated intelligence prevented optimum efficiency.

In August 1941, the increasing proficiency at GC&CS combined with a new system for disseminating Ultra intelligence to increase the value of the source for military commanders. This new link consisted of Special Communication Units that relayed intelligence, and Special Liaison Units that were responsible for security and the dissemination of intelligence. These new arrangements allowed recipients of Ultra intelligence to be indoctrinated as to the source, enabling commanders to get the most out of it. But even the best source of signals intelligence only had access to that information which was signaled and decrypted, and other sources were required.

A change to the system for the interrogation of prisoners also improved its value to close air support and interdiction, which required swiftly processed intelligence. In previous battles, it was found that when distances between CSDIC Cairo and Army headquarters were greater than 100 miles, there was an essential demand for detailed interrogation reports "which could not be supplied by C.S.D.I.C. base because of the time interval involved in sending [prisoners] back to base."126 Moreover, the best time to interrogate prisoners concerning morale and the effect of close air support and interdiction was immediately after capture. Given time, prisoners tended to increase the

effect of such attacks to provide an excuse for their surrender.\textsuperscript{127}

Consequently, CSDIC Cairo created a mobile unit that was employed near the front line so prisoners could be interrogated for tactical information immediately after capture.\textsuperscript{128} However, making use of tactical information required swift processing and dissemination that was often impossible with existing communication links.

The mobile unit also screened incoming prisoners, searching for those likely to produce important information. These prisoners were immediately transported to CSDIC for a more detailed interrogation.\textsuperscript{129}

Since a maximum of sixty prisoners were housed at CSDIC, this phase of the process was crucial to the success of the unit. The initial performance of this unit during the ‘Crusader’ offensive proved disappointing. Although technically, “the unit operated quite satisfactorily”, there was poor liaison between the selecting parties and the unit’s commanding officer, resulting in a poor selection of prisoners.\textsuperscript{130}

These problems, however, did not shake the belief in the potential of this unit, or the value of prisoner of war intelligence.

Captured enemy documents also providing strategic intelligence on enemy intentions and capabilities. This source was initially poorly exploited, but like all other sources, became more important once its

\textsuperscript{129} Ibid; PRO WO 208/3248, Notes on CSDIC Mediterranean, Part 1, p.2.
\textsuperscript{130} AWM 54[423/4/24] CSDIC Mobile Unit.
value was proven and intelligence staffs gained proficiency. By the time of ‘Crusader’ British intelligence officers had gained much valuable experience that allowed for better exploitation of this source. A captured enemy operation order during ‘Crusader’ revealed enemy intentions to abandon his position at Agedabia on 7 January 1942. The plan of withdrawal was completely revealed, showing the positions of and axis of withdrawal of individual units. For example, the 90\textsuperscript{th} Light Division was to hold the defile West of Marsa Brega, Agheila, Ras El Aali and the defile west of El Mugtaa until relieved by other elements of the Afrika Korps.\footnote{JRUML, Papers of Field-Marshal Sir Claude Auchinleck, Item 620 Notes on the Present Military Situation by GSI Adv. HQ 8\textsuperscript{th} Army, 9 January, 1942.} This knowledge prompted tactical reconnaissance missions to areas known to contain suitable targets for close air support.\footnote{Ibid.}

The best and most numerous targets were selected by aerial reconnaissance, aided by strategic intelligence. Both the RAF and British army controlled their own reconnaissance aircraft at the risk of costly duplication of effort, made worse at times when few aircraft were available for reconnaissance of all kinds. By November 1941, both Corps of the newly formed Eighth Army “controlled one A.C. [army cooperation] squadron armed with 16 Hurricane I aircraft” for tactical reconnaissance, while Eighth Army headquarters controlled another squadron which reinforced the Corps’ squadrons when needed.\footnote{PRO AIR 23/1345 Answers to War Office Questions, 27 December 1941, p.2.} These 50 odd aircraft...
operated up to seventy miles behind the front. The RAF’s strategic reconnaissance began approximately where tactical reconnaissance ended, and continued to varying distances depending on the information sought and the limitations of the aircraft.\textsuperscript{134} Originally, the tasks of the six aircraft of the Strategic Reconnaissance Flight were strategic, but they were often required to undertake operational objectives as well.\textsuperscript{135} Both forms of reconnaissance brought back photographs and intelligence potentially useful to ground and air operations, but poor coordination of effort and communications difficulties rendered much of it useless.

To reduce losses, which were sometimes alarmingly high, reconnaissance aircraft were sent out in pairs. One aircraft would reconnoitre the target while the other aircraft (known as a weaver) watched for enemy anti-aircraft emplacements or air attack.\textsuperscript{136} This method was certainly better than sending aircraft out solo, but it also reduced the number of possible reconnaissance flights. Moreover, unless reconnaissance reports were received and quickly acted upon, aircraft could not be dispatched in time to attack.

Tactical and strategic reconnaissance did not consist entirely of visual observation. The tactical and strategic reconnaissance squadrons also conducted oblique photographic reconnaissance, while No. 2 Photo

\textsuperscript{134} PRO AIR 23/6472, Report on reconnaissance before and after the formation of 285 Wing, 1945.
\textsuperscript{135} RAFM Middle East Review No.2 January to March 1943, RAF HQ ME, p.90.
\textsuperscript{136} PRO AIR 23/6472 Report on reconnaissance before and after the formation of 285 Wing, 1945.
Reconnaissance Unit of the RAF took high altitude photographs. Photographs were more useful than visual observation for judging the impact of both close air support and interdiction. Pilots travelling in excess of three hundred miles per hour were not always accurate in their observations, while photographs (properly interpreted by experts) provided more information than pilot reports. Moreover, as the war diary of Panzer Army Africa noted, RAF photographic operations were intended to determine which areas contained targets for attack. The drawback to photo reconnaissance was the time involved in developing and interpreting the pictures. This did not degrade the value of photographs for judging the effect of operations, but did pose serious problems for target location. In order to use photographic intelligence for operational purposes, the film had to be developed, assessed, and the information signalled through the command structure in real-time. Moreover, effective aircraft and photographic equipment was necessary to gather the correct information. These problems were not overcome until the summer of 1942.

Supply problems also hampered the efforts of the RAF’s Strategic Reconnaissance Flight. In order to develop photographs, the technicians at the unit needed quantities of water unavailable around Tmimi where

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137 Ibid.
this unit was based in late 1941. Consequently, once removed from an aircraft at Tmimi, the film had to be flown to rear headquarters at Maaten Bagush for processing, and the results then flown back to advance headquarters. The results, “due to the water problem, were always therefore very late and often uselessly stale on receipt.” Coordinating all reconnaissance efforts in a favourable location would have eliminated these problems.

An important part of the C^3I system of both the RAF and army for the application of close air support was the AASC. The arrangements for these units changed between ‘Compass’ and ‘Crusader’. For roughly the first two years of the war the mechanism for answering calls for support from troops engaged in battle lacked proficiency. In theory, an AASC was employed to accept, modify or reject the requests for support, and to concentrate attacking aircraft at the decisive point. Although the procedures for doing so were laid down prior to the ‘Crusader’ offensive, there was no fully trained AASC in the desert until January 1942, and it was not functioning properly until two months later. During ‘Crusader’ air support was controlled by the Air Officer Commanding Western Desert, aided by the Direct Support Section at army Battle Headquarters. The Direct Support Section Officer on duty wrote the

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139 PRO AIR 23/1345 Army Air Support, Answers to War Office Questions, 27 December 1941.
140 Ibid.
141 PRO WO 169/6638, War Diary of No.2 AASC, January and March 1942.
142 PRO AIR 41/25 The Middle East Campaigns, June 1941 - January 1942, p.62, also p.129.
request down, and passed it to RAF Operations by telephone to obtain the Air Officer Commanding RAF Western Desert’s approval or rejection. If the mission was accepted, he signalled the Wing concerned, which signalled the appropriate landing ground, and aircraft were launched. To reduce the time taken in transmitting calls for air support, targets were described by “means of a Reconnaissance Code and authorized abbreviations. The number of aircraft required was decided at Control H.Q. on the basis of the type of aircraft, availability of aircraft and other demands.” To facilitate multiple sorties against the same target, or to respond to numerous calls for support, Wings or landing grounds communicated the return of their aircraft, and the number available for future operations to the AASC headquarters. Thus, the system was being adapted in response to lessons learned during combat, and the changes included specifying suitable targets for close air support.

A combined Army/RAF memorandum on direct air support issued on 30 September 1941, just prior to the ‘Crusader’ offensive, outlined which targets would be accepted for attack by the RAF. In particular, concentrations of troops or vehicles that could “be surprised in close formation and which would have difficulty in dispersing” were ideal for attack. Also, headquarters and signal centres not under cover, artillery

143 Ibid., p.62, also 129.
144 Ibid., p.61
145 Ibid., p.60.
146 PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, p.4.
positions in the open, crossing points over obstacles, and supply columns could be attacked with effect. Conversely, dispersed or sheltered infantry or vehicles, or motorized transport columns that could disperse easily and rapidly, were considered poor targets. This framework was used to determine the acceptance of targets for both impromptu and pre-arranged close air support. Such was the system that would in theory provide rapid air support. In practice, however, the system often failed.

Prior to ‘Crusader’, a signals exercise was conducted to test the close air support system. The results of this exercise, held in October 1941, were not promising. Even during relative calm, signals to the landing ground took twenty minutes to clear, and the formation requesting support was never once informed that the RAF had accepted the mission. Consequently, when the aircraft arrived overhead, recognition signals were not displayed, and the aircraft could not be sure of their target. Had this been an actual mission, the resources involved in launching aircraft to attack would have been wasted, and the attempt would have put pilots and aircraft at risk for no gain. Moreover, signalling would have tied up the channels unnecessarily. In this exercise the attacking aircraft arrived over the target more than an hour and a half after the request was made. It was considered that any support arriving

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147 Ibid.
148 PRO WO 169/1123 GS 30 Corps War Diary 1941, Air Support and Signals Exercise, October 1941.
that late would “not be in time to be of use and may only complicate operations and endanger our own troops.”

To lessen the possibility of attack by friendly aircraft, the methods for identifying the target and friendly troops were enhanced. Initially, each tentacle was supplied with white cloth arrows fifteen feet in length. The arrow was pointed towards the target and bars placed on the sign to indicate distance from the target. Other procedures included painting white St. George’s crosses on vehicles, but this was superseded by painting RAF roundels on the roof of vehicles, as pilots were used to scanning for such markings on aircraft. In late 1941, four-foot black flags surmounted by a white ‘T’ were issued to tanks and armoured vehicles for the ‘Crusader’ offensive, but insufficient quantities were available and crews were unable or unwilling to stop and display the flags. Moreover, the common practice of using captured vehicles degraded the usefulness of all these measures.

On 29 October 1941, a joint RAF/Army instruction was issued on ground/air recognition that codified all the methods tried to date. Bombers, flying at or above 6,000 feet to avoid enemy flak, were to fire a white illuminating cartridge to which the ground units would respond using their own illuminating cartridge, a smoke bomb or canister, or a large “T” ground strip. In addition a large “V” sign was placed on the

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149 Ibid.
150 LHCMA, Papers of Major General McNeill 2/4 B4, memorandum entitled Ground/Air Recognition, Oct. 1941.
ground to direct the bombers to the target. Ground strips were placed fifteen minutes before the prearranged time of attack, and kept out for thirty minutes. On the approach of the aircraft (when they were four to five miles away), smoke and illuminating cartridges were lit.\textsuperscript{151} Thus, in all areas, the RAF close air support system was improving, but the effect of these changes was not felt until after ‘Crusader’.

The RAF received its next opportunity to affect the course of fighting on the ground in November 1941. At this point, the Axis forces held the Libyan side of the Libyan-Egyptian frontier, with the Italian Savona division holding the fortified towns of Bardia, Sollum, Capuzzo and Halfaya. The Bologna, Pavia, Brescia, and Trento divisions were investing Tobruk, while the Ariete and Trieste divisions were near Bir El Gubi. The Afrika Korps, consisting of the 15\textsuperscript{th} and 21\textsuperscript{st} Panzer Divisions and the 90\textsuperscript{th} Light Division, was grouped between Gambut and Sidi Rezegh, also in a position to assault Tobruk.\textsuperscript{152}

The aim of ‘Crusader’ was nothing if not ambitious. Its goal was to pre-empt Rommel’s plan to attack Tobruk, to destroy the entire German and Italian armies in Libya, and then to eliminate the Axis base in Africa. To accomplish this, the British XXX Corps was given the task of destroying the enemy’s armoured forces, and was “also responsible for

\textsuperscript{151} WO 169/1123 GS 30 Corps War Diary 1941 Appendix KK to 30 Corps Operation Instruction No.1, Ground/Air Recognition 7 Nov 41.
protecting the left flank of XIII Corps."\textsuperscript{153} The specific plan called for XIII Corps to surround and capture the static defences between Sollum and Sidi Omar, while XXX Corps' armour crossed the frontier south of Sidi Omar and engaged the Afrika Korps' panzers. Then XXX Corps was to join up with the Tobruk garrison, advance through the Axis forces at Gazala, and regain Cyrenaica.\textsuperscript{154} This action was the first phase in a planned invasion of the Libyan province of Tripolitania. With the Germans pushed out of Libya the British could then form the main front at the Northern, instead of the Western, extremity of the Middle East Command, and stand guard against a German drive through the Caucasus.\textsuperscript{155} Air power figured prominently in the campaign plans.

In some areas, the RAF was better prepared to conduct tactical air operations during 'Crusader' than it had been during 'Battleaxe'. RAF air strength grew continuously during the summer and fall of 1941. By the time of the Crusader offensive in November 1941, the RAF surpassed the Axis air forces in gross numbers of aircraft, and even more so in operational numbers. The RAF had just over six hundred aircraft, as compared with just over five hundred for the Axis air forces.\textsuperscript{156} Its operational numbers were roughly 550, compared with the roughly 270

\textsuperscript{153} PRO WO 169/1107, War Diary of XIII Corps, 8 Nov. 1941.  
\textsuperscript{154} Pitt, p.340.  
\textsuperscript{155} Richards, II, p.171.  
\textsuperscript{156} PRO AIR 41/25 The Middle East Campaigns, June 1941 - January 1942, p.87; also see Sebastian Cox "The Difference between White and Black: Churchill, Imperial Politics, and Intelligence before the 1941 Crusader Offensive," Intelligence and National Security, Vol.9 No.3, July 1996, which deals with numbers of aircraft prior to 'Crusader', and how intelligence was distorted to reflect the wishes of superiors.
operational Axis aircraft.\(^{157}\) The RAF had also begun to receive aircraft well suited to multiple operations. The first squadron to use fighter/bombers in combat was 80 Squadron with its new Hurricane fighter/bombers each carrying eight forty-pound bombs, adding a new and uniquely flexible dimension to air operations.\(^{158}\) These aircraft could be used in close air support, interdiction, and air defence operations, provided C\(^3\)I systems were flexible enough to allow it.

Intelligence organizations and communication systems, although improving, were still unable to guide air operations in a consistent fashion, or to use British resources with anywhere near full efficiency.\(^{159}\) Because of slow communication systems, which became overloaded with traffic once ground operations began, intelligence and orders could not flow through the command structure in time to guide precise strikes. Ultra still provided little consistent information on the German army, 'Y' organizations were small, inefficient, and not integrated into the intelligence system, and both strategic and tactical reconnaissance were as yet unfocused. The air support system was still slow and inefficient (the average time for response to calls for support was three hours during 'Crusader'), and conditions on the ground prevented it from functioning with any consistent effect.\(^{160}\) Consequently, both land-based interdiction

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\(^{157}\) PRO AIR 41/25 The Middle East Campaigns, June 1941 - January 1942, p.87.


and close air support in the 'Crusader' offensive were inefficient, but the conditions in the desert made interdiction fundamental to British victory in a close run affair.

'Crusader' was an extraordinarily confused battle, marked by major errors of command and a complete collapse in communications on both sides. It can be aptly described as the battle both sides deserved to lose. The British attack caught the Germans entirely by surprise, and penetrated quickly through the Axis defensive system, capturing or encircling large enemy formations. Then, British armoured forces drove to engage the enemy armour while New Zealand infantry drove along the coast to relieve Tobruk. Here, however, British luck ended. When the anticipated armoured battle did not take place, British commanders were unsure of how to proceed, and their armour stalled only to be decimated by a German counter-attack at Sidi Rezegh.

Rommel, in turn, failed to make proper use of his victory over the British armour. Instead of destroying the paralysed and temporarily fragmented British forces in front of him, he gathered the entire Afrika Korps around him and made his famous dash for the wire – straight toward Egypt. For several days, the British and Axis forces in Libya were intermixed, and confusion reigned supreme as troops from both

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161 Lewin, Rommel as Military Commander, p.66.
162 JRUML, Papers of Field-Marshal Sir Claude Auchinleck, Item 450, Situation Report from Battle HQ 30 Corps, 23 November 1941.
163 Lewin, Rommel as Military Commander, pp.76-78.
sides overran the rear echelons and landing grounds of the other. Under such confused conditions, it was impossible for RAF close air support to function because of a paralysis of communications, and thus command. British units were out of touch with each other and with the RAF, making recognition of potential targets extremely difficult. However, on rare occasions close air did prove its potential.

For example, during a minor engagement before the start of ‘Crusader’ intelligence tracked a column of tanks and motorized infantry from Quburet El Sabaya moving south to Alawat Talata. Because of confusion and communication problems, it took the RAF over two hours to attack. By a stroke of luck, the battle had not shifted during the delay, and the concentrations of armour were attacked by the RAF “with great effect”, causing a number of fires amongst the refuelling party and the explosion of an ammunition lorry.\footnote{PRO WO 169/1107 War Diary of XIII Corps, Special Intelligence Summary Report on Operations 13-15 September 1941.} Photographic reconnaissance confirmed that the total damage inflicted, with no loss to British aircraft, was 1 Mark III tank, 4 petrol lorries, 2 ammunition lorries, 1 Mercedes Bentz staff car, and 3 Opel-Blitz lorries destroyed. In addition, 2 four-wheeled armoured cars, one 30 cwt vehicle, and 13 medium tanks were put out of action but recovered by the enemy. Pilots also estimated that 20 Axis soldiers were killed and between 50 and 70 were wounded in the
action. Despite this example of occasional success, close air support made no consistent impact on the course of the 'Crusader' battle.

Ultimately the British won the battle, for several reasons. The New Zealand Division over-ran the Afrika Korps' headquarters and came close to relieving Tobruk itself, forcing Rommel's forces to fall back hastily from the frontier. Though the Afrika Korps drove the New Zealanders away from Tobruk at a very heavy cost to them, by early December 1941, the Axis realized that the British armour had recovered, and that their own military position was too confused to allow anything other than a retreat or a stand up fight. Moreover, Rommel also realized that the battle had turned to one of attrition that his supply state would not allow him to win.

During these operations the RAF was focusing its efforts primarily on interdiction. Very similar to Luftwaffe doctrine, during the preparatory phase of the 'Crusader' operation, the priorities for the RAF were to "weaken the enemy air force, and to prevent supplies from reaching the enemy air and military forces at the front." During the battle, the RAF targeted the road between El Adem and Acroma with heavy damage being inflicted on vital supply convoys. In one raid, a squadron of Hurricane fighter/bombers escorted by three squadrons of Tomahawks and Hurricanes "made two successful attacks on a large column of enemy

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165 Ibid.
"M.T." on the road between Acroma and El Adem.\footnote{PRO AIR 24/1662, Operations Record Book, Air Headquarters Western Desert, 22 November 1941.} The attack was continued by two formations of twelve Blenheims each, and it was estimated that 100 vehicles (including 10 petrol tankers) were destroyed, blocking the road in several places. A large supply dump was also located and attacked. The second Blenheim formation was attacked by 20 Me109 fighters with the loss of two Blenheims with a further two damaged.\footnote{Ibid.} Also, Beaufighters from No.272 Squadron, Hurricanes from No.33 Squadrons, Tomahawks from No.2 Squadron SAAF, and the Hurricane fighter/bombers of No.80 Squadron dealt heavily with transport vehicles.\footnote{Richards, II, p.175.}

The ability of RAF pilots to attack successfully such targets had improved in response to incoming intelligence from pilots. At the beginning of the war, for example, fighter pilots engaged in the practice of "hose-piping" concentrations of vehicles or tanks.\footnote{AIR 23/1281 Middle East Tactical Memorandum No.9, Ground Strafing by Single Seat Fighters, February 1942, pp. 1-2.} Pilots would fly directly down the length of the column, spraying machine gun fire at every target. Intelligence brought back by attacking pilots and reconnaissance reports, however, revealed the inefficiency of this approach. Given the high speed of the aircraft, most bullets "hit the brown" between the targets, while the enemy could "fire a vertical barrage with effect" against aircraft flying down the length of the road.
Since the fighter/bomber was introduced during ‘Crusader’, pilots had to go through the same process of determining effective tactics for them, and this had been done by mid-1942.

Twin-engine Bristol Beaufighters, called by Axis soldiers the “Order of Dread”, proved especially deadly to thin-skinned motorized transport, and were usually employed in pairs. When attacking such a target, the aircraft "usually went out over the sea, keeping at least 30 miles off shore to avoid RDF detection." They then turned inland to attack their target. Both aircraft flew alongside the road at below fifty feet until the target was sighted, at which time they pulled up to 300 feet, picked their own target, and fired their guns at it. After delivering a short burst, another target was selected, and progress along the road was by means of a corkscrewing motion from side to side of the road "with the pilot pulling up to 300 feet before making each attack." Only very rarely were aircraft to make more than one pass over the target area, due to the risk of anti-aircraft fire.

These aircraft were so effective in this role that on 27 November 1941, Air Marshal Tedder contacted the Air Ministry in an attempt to secure a loan of some Beaufighters, which would operate from Malta, to attack road targets from Tripoli to Benghazi. This route had “shown

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171 Ibid., p.2.
173 PRO AIR 23/1281 Middle East Tactical Memorandum - The Employment of Beaufighters in Day Operations, November 1941.
174 Ibid.
heavy traffic with petrol tankers, etc.\textsuperscript{175} A dramatic example of what even small numbers of these aircraft could do came on 2 January 1942. During a road-strafing mission, four Beaufighters “shot up about 60 M.T. between AGEILIA and SIRTE, destroying twelve including one petrol tanker, damaging thirty”.\textsuperscript{176} The Beaufighters suffered no losses and inflicted considerable damage.

Such attacks reduced enemy supplies to a very low level, and put the enemy air forces on the defensive.\textsuperscript{177} The credit for the poor state of Axis supply must be shared with the RAF and Royal Navy’s sea interdiction campaign, which reached its peak of efficiency and effect during the ‘Crusader’ offensive. For example, during November 1941, only 37.6 percent of the supplies dispatched from Italy reached Libya.\textsuperscript{178} This was, however, the exception to the rule. During the whole of 1941, 88.9 percent of the supplies dispatched from Italy arrived in Libya.\textsuperscript{179} Because of the success of the sea interdiction campaign in November 1941, the Axis supply situation was precarious when the Eighth Army began its offensive, and the RAF’s land based interdiction quickly made it worse.\textsuperscript{180} The damage from both land and sea interdiction meant that Rommel could not hold his front.

\textsuperscript{175} PRO AIR 23/1345, Secret Cipher Message from Air Marshal Tedder to the Air Ministry, Whitehall, 27 November 1941.
\textsuperscript{176} PRO AIR 24/1080 A.875, Operations Record Book Appendices Middle East Air Staff 1942, 2 January 1942.
\textsuperscript{177} Richards, II, p.172.
\textsuperscript{179} Ibid.
\textsuperscript{180} JRUMIL, Papers of Field-Marshal Sir Claude Auchinleck, Item 595 Brief Appreciation of the
On 4 December 1941, Rommel ordered a general retreat, leaving 13,800 German and Italian soldiers in Sollum and Bardia to their fates.\textsuperscript{181} ‘Crusader’ was an Axis defeat, one in which air interdiction proved to be a British trump card, and where close air support occasionally proved its potential both materially and morally. A battle which was being lost by British commanders and British armour was saved by the RAF, the Royal Navy, the New Zealand Division, and Erwin Rommel’s actions.

As the British pursued the retreating Afrika Korps, the RAF’s power to conduct either close air support or interdiction declined because British forces ran into supply difficulties of their own. In particular, the “extent of direct support during the latter stages of the 'Crusader' offensive was...limited by the fuel shortages at the advanced landing grounds.”\textsuperscript{182} Pursued by the British, the Germans withdrew westward until they consolidated their position at El Agheila in January 1942. Both armies paused to replenish their supplies, and victory in the next round of fighting was decided by the side first able to amass sufficient supplies to continue the offensive. The withdrawal had eased the Axis supply position, with their main forces now only 500 miles from Tripoli, instead of roughly 1000 miles at Bardia, and the British “line of communications was now ominously long in proportion to the available transport.”\textsuperscript{183}

\textsuperscript{181} Lewin, Rommel as Military Commander, p.96.
\textsuperscript{182} PRO AIR 41/25 The Middle East Campaigns, June 1941 - January 1942, p.296.
\textsuperscript{183} PRO CAB 106/650, The Crusader Operation 18 November - 29 December 1941, p.19.
Moreover, men and equipment had been removed from North Africa to Malaya, Burma, and India, while the British forces were 1000 miles from their main supply base in Cairo. The RAF was unable to continue its large-scale operations because of supply and deployment difficulties of its own. For example, "half the fighter force had just moved back to Msus", some 200 miles behind the front, and could not take part in the battle. Hence, the result of the pursuit after 'Crusader' was to turn the tables on the British, who were unable to overcome their logistical problems or to prevent the Germans from rebuilding their supplies quickly.

Despite the failure of close air support to consistently effect the battle, the attempt was well received on the ground, as Auchinleck attested in 1942. He wrote that an important feature of 'Crusader' "has been our complete air supremacy and excellent co-operation between ground and air." He also wrote that it was "no exaggeration to say that but for the unfailing and complete response of the Royal Air Force to all demands and requests made by the Eighth Army, the relief of Tobruk could not have been accomplished." Aside from the purely material loss inflicted by the aforementioned attacks, the mere presence of aircraft overhead "in all probability affected the enemy’s future action, but above all cheered our own troops enormously." The commander of XIII Corps

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155 PRO CAB 101/136 Telegram from C-in-C Middle East A-O-C-in-C Middle East, 1942.
157 Ibid.
hoped “our airmen recognize the tremendous uplift of morale which such effective and close support air action gives to the forward troops; it is worth more to them than any number of accounts of indirect air support.” Although largely ineffective, close air support operations were showing signs of increasingly destructive potential and cost-effectiveness, and the ground forces appreciated the effort. In the middle of 1942, the ability of the RAF to affect the course of battle through tactical air power would increase dramatically, as the elements of the system came together.

188 Ibid.
Changes to C\textsuperscript{3}I systems, instituted in 1941 as a result of lessons learned during operations against Axis forces, combined with the increasing competence of intelligence personnel to improve substantially the ability of the RAF to respond to calls for support by mid-1942. At the same time, aircraft better suited to close air support operations were arriving in the Middle East in increasing numbers, and RAF pilots were developing tactics to maximize the effect of their attacks while minimizing losses. This chapter will show how these developments increased dramatically the RAF's ability to provide close air support. However, all forms of air support were dependent upon the army’s performance, as forward airfields were very close to the front. When it succeeded and held its position against the enemy, aircraft could continue to operate over the front and beyond. When the army failed, the RAF had to withdraw as well, and its ability to conduct operations suffered as a result. Without the ability to receive intelligence on the course of the battle, and to predict accurately the timing and thrust of Axis attacks, British commanders were unable to complete the ‘Boyd’ loop quickly enough to counter the Axis forces. The result was chaos on the ground, and often defeat.

For example, on 21 January 1942, General Auchinleck commented that “the improbable occurred, and without warning the enemy began to
advantage."\(^1\) The unprepared British forces were quickly defeated, but as the Germans advanced they soon out-distanced their protective air cover, and the RAF once again attacked German supply convoys. The efficiency of this campaign was degraded by the constant need to abandon airfields and retreat eastward, but its effect was notable. As the Germans advanced, they once again ran into supply difficulties of their own, and the RAF made these difficulties worse. The German advance halted at the Gazala line, roughly thirty miles short of Tobruk, because of "resistance on the ground, resistance in the air, and sheer malnutrition."\(^2\)

RAF close air support was again lacking in real punch, but was showing signs of improvement. The Operations Record Book of the Desert Air Force records that an interesting feature of operations in February 1942 was "the switching, after bombing, of fighter-bombers onto strafing targets found by Tac/R whilst the fighter-bombers were still in the air."\(^3\) It was not until March that the newly arrived No. 2 AASC was functioning properly in the Western Desert.\(^4\) However, because of the evolution of increasingly efficient C\(^3\)l arrangements, and the work of Major McNeil (the commanding officer of No. 2 AASC), the teething pains were quickly overcome.\(^5\) McNeil remarked that with "fighter bombers available, direct air support may become a reality at last and not a political

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\(^1\) Lewin, Rommel as Military Commander, op. cit., p.96.  
\(^2\) Richards, II, op. cit., p.187.  
\(^3\) PRO Air 24/443 Operations Record Book of Forward Desert Air Force, February 1942.  
\(^4\) PRO WO 169/6638 War Diary of No.2 AASC. This unit arrived in the Middle East on 28 January 1942, but was not fully functional until two months later.  
\(^5\) ibid., 6\(^{th}\), 9\(^{th}\), 19\(^{th}\) May 1942.
McNeill also arranged several exercises to train fighter/bomber pilots in proper tactics based on recent experience, and pushed ahead the adoption of the newly arrived VHF R/T, which was superior to HF because distant interference was eliminated. This resulted in more reliable and clearer communications, but since the ionosphere did not reflect VHF radio waves, reception depended upon being within the line of sight of the transmitter. By March 1942, VHF R/T equipment was tested and the “refitting of aircraft equipment was well under way.” The result was a substantial improvement in the efficiency of fighter and tactical reconnaissance aircraft. Tedder wrote that on 31 May 1942, “when No.73 Squadron were airborne with orders to strafe a certain position, the Army captured the point; within fourteen minutes the Squadron had been successfully re-directed by V.H.F. R/T to another target.”

The RAF signals system was further enhanced by a signals plan instituted in early 1942. It provided two operational and one administrative W/T channel from the Wings to Advanced and rear Air Headquarters respectively. Rear Headquarters was responsible for communicating with units in the rear areas, and Advanced Headquarters

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6 Ibid., 9 May 1942.
7 Ibid., 14 March 1942.
8 Devereux, op. cit., p.82.
10 Ibid.
11 Ibid.
was responsible for "all forward independent unit communications, such as Advanced Air Stores Parks and Repair and Salvage Units." The effect of this was to increase the efficiency and speed of RAF communications. Nevertheless, with such extensive W/T links, both services needed good equipment and skilled personnel to operate it.

The introduction, in 1941, of specialized wireless vehicles proved its value in 1942. By May 1942, a steady flow of general-purpose W/T vehicles was being delivered to the RAF, providing excellent mobile communications. This facility allowed the RAF to remove signals equipment and staffs from squadrons, and re-organize them into mobile units under the command of major units, making the system more flexible and more streamlined, while still providing effective communications. The problems with communication came during operations, when wireless operators were unable to handle securely the volume of traffic.

The RAF took a major step towards overcoming this problem in October 1941, by establishing a Middle East Cipher School to augment the inadequate supply of trained cipher staff from the United Kingdom. Even so, this school failed to meet the air force's requirements, especially when the signals organization was expanded early in 1942 following the stabilization of the Gazala line. To improve the general proficiency of cipher operators and provide more of them, the Middle East Signals

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12 Ibid.
13 Ibid.
14 Ibid.
School was, therefore, opened in March 1942. This school had the dual purpose of training new signals personnel on the equipment they would use during operations, and providing refresher training for current personnel to maintain their skills.\textsuperscript{15}

Another major development in mid-1942 was the construction of the Telecommunication Centre, Middle East. This centre was designed to relieve the pressure of the main H.Q. signals station. The facilities were used on an "inter-Service ‘common user’ basis", and were staffed by both army and air force personnel. There were some fifty W/T and fifty teleprinter circuits, and they handled an average of 450,000 cipher groups per day.\textsuperscript{16} The resulting improvements at all levels ensured the rapid transfer of orders and intelligence from both army and RAF sources.

It was not until the middle of 1942 that the RAF's signals personnel achieved sufficient proficiency. It was at approximately the same time that the Eighth Army's communication system achieved a similar state of competence. By the time of Rommel's Gazala offensive in May 1942, dedicated "R/T and W/T circuits linked all connections of Eighth Army command between formations and down to armoured car, tank, artillery regiments, and infantry battalions."\textsuperscript{17} Separation of operational and administrative links occurred in May 1942, with beneficial results, and links between corps and division were changed so main and

\textsuperscript{15} Ibid.
\textsuperscript{16} Ibid.
\textsuperscript{17} John Ferris, "The British Army, Signals and Security," op. cit., p.278.
rear divisional headquarters were in direct contact with main and rear corps headquarters respectively. This replaced having advance divisional headquarters handling all traffic to both main and rear corps headquarters. Meanwhile the forward R/T link from division to brigade, which "often had some sixteen or more stations on it and could not possibly cope with cipher traffic or long written messages", was augmented with W/T links. Indeed, by February 1942, there was more concern over a paucity of available frequencies than over a lack of radio sets. Given the importance of signals to mobile operations, the efficiency of RAF close air support could not have reached its zenith before this point, no matter what improvements occurred in intelligence or other matters. However, improvements in these other areas were well under way by the middle of 1942, and further enhanced the air support system.

The ability of the RAF to provide close air support depended upon a close working relationship with the army. The relationship had its roots with Cunningham and Coningham, under the direction of Tedder and Auchinleck. The headquarters of the Eighth Army and RAF, Western Desert were sited alongside each other, and it was clear that the RAF,

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19 Ibid.
20 Ibid.
22 NAM, Papers of Lieutenant General Cunningham, 8303-104/17, Despatch on Operations, undated, p.6.
although independent, was ready to support operations. As Air Chief Marshal Sir Kenneth Cross, one of Coningham’s Wing Commanders in the Western Desert and the man chosen to command 242 Group in Tunisia, later recalled,

in General Sir Claude Auchinleck, Tedder had as a colleague one of the most intelligent Generals on the British side in the entire war. He saw very early on the virtues of centralized control of air forces by the Air Officer Commanding located alongside the Army Commander.\(^23\)

This command relationship was fundamentally important to providing rapid close air support, and although Montgomery evolved this principle to an art before and during El Alamein, its roots predated his arrival in Africa. Thus, the command structure and communication system had evolved to a level where they could facilitate close air support by allowing intelligence and orders to flow with minimal delay. Strategic, operational, and tactical intelligence could then be used to focus British air resources at the best available targets. The value of Ultra, for example, improved substantially due to increased access to German army keys in mid-1942.

The first three months of 1942 were characterized by intermittent success against Axis Enigma keys. German air and Italian naval decrypts gave some indication of the supply state of the Axis forces, but it was not until May that success against the German army keys increased.\(^24\) In May, a series of decrypts revealed Rommel’s planned offensive, but not


\(^{24}\) Bennett, op. cit., p.114.
where the blow would fall. For example, one decrypt consisted of a request by Panzer Army Africa for lorries needed to support "coming projected operations." GHQ Middle East was able to predict the date of the offensive, but both Ritchie and Auchinleck felt it more likely that Rommel would drive through the British line towards Tobruk. Nothing in the Ultra decrypts persuaded them otherwise. However, this is more a failure of interpretation than a flaw in the source.

British 'Y' became more complex and important to tactical air operations in mid-1942. By May 1942, army 'Y' comprised 1,300 all ranks, and by October 1942 had increased to 2,400. RAF 'Y' also grew rapidly during 1942, employing 1,000 people by the end of the year. In addition to providing intelligence on enemy order of battle, 'Y' sometimes intercepted vital information concerning the state of enemy supplies. For example, on 20 May 1942, RAF 'Y' learned that the total stocks of aviation fuel in the whole of Libya was only 3283 tons. Such information was used to confirm information from other sources and fill in missing pieces of the puzzle. In the context of an increasing familiarity with the enemy's organisation, normal procedures, and even the personalities of its commanders, largely provided by Ultra and prisoner of war interrogations, the value of 'Y' increased in 1942.

27 PRO WO 208/5077, GSI (s) to DDMI (I), 14 February, 1942; WO 208/5021, Military 'Y' Middle East, GSI (s), 2 March, 1942.
28 Clayton, op. cit., p.151.
29 PRO AIR 40/2345 Y Daily Reports Middle East for 20 May, 1942.
The value of prisoner of war interrogation had improved by the middle of 1942 because of experience in dealing with prisoners during the previous operations. Indeed, by 1942, the New Zealand Military Forces estimated that “at least 40% of our intelligence has been obtained in this way while most essential confirmation of that obtained from other sources has also been obtained from prisoners of war.”\(^\text{30}\) It was discovered that a skilful interrogator could obtain varied and often crucial information from prisoners. For example, one prisoner provided details “of the entire German sabotage organisation”, and warned of planned sabotage raids on the railway near Mersa Matruh.\(^\text{31}\) Another prisoner provided a description of the German enigma cipher, the procedures for its use, and the schedule for changing the key.\(^\text{32}\) Although some interrogations revealed startling information of this type, generally CSDIC simply supplied a constant stream of small bits of reliable information, which, added to intelligence from other sources, could confirm suspicions and answer important questions. Such material was very important to air support operations because it provided a constant picture of the German supply situation, accurate information on results of RAF raids, and indications as to what effect both interdiction and close air support were having on German morale.\(^\text{33}\)


\(^{32}\) PRO WO 208/4193, Interrogation of Italian Prisoner I/S S.R.X. 111, August 1941.

\(^{33}\) AWM 54(423/4/24] Memorandum entitled Items of RAF interest from PW Sources, 7 May 1942.
Captured documents were being used to aid in the interrogation of prisoners, and helped to gauge the effect of close air support operations. For example, a captured document revealed that in addition to the extensive material damage caused, the effect on morale was also great. The spirit of the troops was considerably depressed owing to the totally inadequate German fighter cover. Incessant night attacks in particular served to reduce the degree of readiness for action of both officers and men (no sleep, continual waiting for the next bombs, dispersal of units etc.)\textsuperscript{34}

The same report detailed that a series of RAF attacks had killed 10 officers and 100 NCOs and men, and wounded a further 5 officers and 300 NCOs and men. Furthermore, 170 vehicles including one tank were permanently destroyed, and a further 270 vehicles and two tanks were temporarily put out of action.\textsuperscript{35}

Captured documents also assisted interdiction operations. For example, in May 1942, summaries of the German supply system were obtained that showed that its ammunition depot was 36.2 kilometres from Derna, the fuel and motorized transport depot was 38.3 kilometres east of Derna, and its rations depot was 41.9 kilometres east of Derna.\textsuperscript{36}

Again, captured documents and prisoner of war intelligence allowed the British to piece together the procedures followed in transporting supplies forward. For example, stores of food, ammunition and fuel were driven in

\textsuperscript{34} PRO AIR 20/7706, War Diary of Panzer Army Africa 28 July-23 October, memorandum from Panzer Army HQ Ia, 5 September 1942.

\textsuperscript{35} Ibid.

\textsuperscript{36} PRO CAB 106/1219 General Playfair's Correspondence about the Enemy Supply Situation, May 1942.
convoy from Tripoli to the forward dumps without re-loading. The travel time was “from 0600-1600 hours daily”, and the supply columns used the main coastal road. On the Eastward journey, when loaded the southern road between Barce and Giovanni Berta was used, and on the empty westward journey, the northern road was used. Additionally, the forward delivery points for all stores were known. Captured documents “as amended by air photographs and recent P.W. [prisoner of war] statements showed that the munitions delivery point and ordnance store was 28 kilometres west of Tobruk.” Since the British also knew where the forward dumps were located, reconnaissance could easily locate important fuel and ammunition convoys. This detailed knowledge of the enemy’s supply system helped to focus interdiction operations, and thus improve their cost-effectiveness.

The importance of aerial reconnaissance to close air support had been proven in both ‘Compass’ and ‘Crusader’. To make reconnaissance worth the expenditure of fuel and the risk to pilots and aircraft, the information obtained had to reach quickly those who could use it. By the middle of 1942, the system for doing so had evolved.

Upon completion of all reconnaissance sorties, the pilots were debriefed by the Squadron Intelligence Officer and the Air Liaison Officer (ALO). Any urgent information was immediately flashed over R/T links up

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37 PRO AIR 41/25 Enemy Supply System in Libya, November 1941.
38 Ibid.
39 Ibid.
40 Ibid.
the chain of command to interested parties. This minimized delays between the receipt and the transmission of important intelligence. After the debriefing was completed, a full report of the operation was sent out over the rear W/T link. The ALO from an army cooperation squadron phoned the G3 Air at Corps headquarters, who passed the information to the other Corps and to Eighth Army headquarters. From there, it was signalled to Air Headquarters, Western Desert and the appropriate squadrons. The squadron intelligence officer of the Royal Air Force’s Strategic Reconnaissance Flight relayed the information to Wing headquarters, and then to Air Headquarters, Western Desert, and HQ Royal Air Force Middle East. Decisions were made on the information, and orders transmitted to the squadrons. The Liaison Officer signalled information relevant to the army.

Although this procedure functioned tolerably well, it had obvious problems. Intelligence of a limited life span could not be used until the aircraft made its return journey, the pilot was de-briefed, and the information signalled to those who could use it. Moreover, during operations communications frequently became overloaded with other traffic, adding to the problems and rendering much intelligence less valuable or useless. In such cases, one had expended precious resources

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41 PRO WO 201/539 Instructions for the Collection and Quick Dissemination of Information, 9 May ’42.
42 Ibid.
43 Ibid.
44 Ibid.
and risked the loss of others, but gained nothing. Until more rapid methods of transmitting information were developed, reconnaissance efforts were not as efficient as they might have been, nor were those operations which relied on reconnaissance for their success.

The introduction of VHF R/T in early 1942 alleviated much of this difficulty by allowing reconnaissance pilots to transmit their findings while they were still in the air. Although a distinct improvement over the previous procedure, this too had problems. When tactical reconnaissance aircraft flew at fifty feet, the range of their radio sets was about fifteen miles.\textsuperscript{46} To overcome this obstacle, pilots began using the AASC, whose sets were farther forward. This allowed much intelligence to flow more rapidly and safely, as aircraft did not have to climb and risk detection in order to transmit their reports. This became standard practice by April 1942.\textsuperscript{46}

It was not until late 1942 that photographic reconnaissance received the material and structural reorganization that allowed it to function effectively. For example, during Rommel's offensive at Gazala in June 1942, the chief request for photographic reconnaissance for the army was the location of enemy armour. This was found to be "a difficult and frequently impossible task due to the fact that, although 36" lenses were in use in the United Kingdom, the best that could be provided in the

\textsuperscript{46} PRO WO 169/6638, War Diary of No.2 AASC, memorandum from Major McNeill to BGS 8\textsuperscript{th} Army discussing the employment of the AASC, 1 April 1942.
\textsuperscript{46} Ibid.
Middle East was the 20" [lens]", unsuitable for the task. By the middle of 1942, both the structure and the equipment of photographic reconnaissance units had been improved. For instance, twelve ‘D’ Spitfires arrived in February, in time to play an important part in stopping Rommel’s advance at El Alamein, and in the following battles.

The RAF had its Photo Reconnaissance Unit engaged in target location and damage assessment. Its procedures for production of intelligence had improved by mid-1942. The film was collected by the ALO on the landing ground and developed by detachments of the Middle East Interpretation Unit (MEIU) stationed at Advance Air Headquarters Western Desert. First phase interpretation was telephoned to the Senior Intelligence Officer Air Headquarters Western Desert, who would arrange for attacks to be launched against potential targets if the intelligence arrived in time. The full written report on the photographs was sent by the next morning to “GSI Eighth Army and SIO Air HQ WD” by hand, and to the two Corps “via G (Ops) Eighth Army by LO or next fastest means.” Aside from the three flights of No.2 Photo Reconnaissance Unit (one flight based in the Western Desert and another two at Heliopolis), No. 60 South African Survey flight and the Strategic

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47 PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, Photographic Interpretation in the Middle East, pp.2-3.
49 PRO WO 201/539 Instructions for the Collection and Quick Dissemination of Information, 9 May 1942.
50 Ibid.
Reconnaissance Flight from Air Headquarters Western Desert were also engaged in photographic reconnaissance for the RAF.  

Army cooperation squadrons handled much of the photographic reconnaissance for the army, and the procedures for producing and transmitting intelligence were similar to those employed by the RAF. The photographs were developed and printed at the squadron and the results were interpreted by a detachment of the Army Air Photo Interpretation Unit (AAPIU) at Eighth Army headquarters. First phase interpretation results, which dealt with time-sensitive operational intelligence, were telephoned to G3 Air at Corps and G2 Air at army headquarters. If the telephone was unavailable, information was sent over wireless links including the AASC link for urgent information. A more complete interpretation was distributed by the quickest means available from the AAPIU to both Corps headquarters and to GSI Eighth Army, and distributed onwards to the RAF as required.

To have more than one service control and conduct reconnaissance was a costly duplication of effort. It did allow the army and the RAF each to meet its own reconnaissance needs quickly, but at the expense of overall efficiency. Without a centralised controlling formation, there was no coordination of effort, resulting in confusion, wasted resources, and

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81 PRO AIR 40/1167, Photographic Reconnaissance; RAFM, Middle East Review No.2, Jan-Mar 1943, HQ RAF Middle East, p.90.
82 PRO AIR 23/6472 No. 285 Reconnaissance Wing: Report on Organization and Operational Methods from Formation Until the Conclusion of the European War, 1945.
83 PRO WO 201/539 Instructions for the Collection and Quick Dissemination of Information 9 May 1942.
decreased efficiency. The Army Co-operation squadrons were, in effect, independent units that moved with their respective Corps headquarters; they were difficult to administer and were often “completely out of touch with the air situation.” The desire to ensure reconnaissance needs were being met is understandable, but the refusal to trust the RAF to do so is in contrast to the efforts towards streamlining the C³I system, and is reminiscent of the inter-war struggles in Britain over which service should control air forces.

The AASC began functioning in the desert in March 1942, replacing the improvised structure set up during ‘Crusader’. As in ‘Crusader’, however, the control of air support aircraft continued to be vested in the Air Officer Commanding at the combined Battle Headquarters of Eighth Army and Advanced Air Headquarters, Western Desert. The AASC itself could be positioned at Corps, where it would sift the requests for likely targets from tentacles and reconnaissance aircraft, and then pass them on to the AOC. More commonly, however, the AASC was positioned at the combined Army/Air headquarters. This layout became typical for the remainder of the campaigns in the Mediterranean, and was an important element in the flexible use of tactical air power.

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54 PRO AIR 23/6472 No. 285 Reconnaissance Wing: Report on Organization and Operational Methods from Formation Until the Conclusion of the European War, 1945.  
55 LHCMA, Papers of Major General McNeill, 2/8 B8, Middle East Training Pamphlet 3A.
There were two distinct elements to the AASC. The first component consisted of two army staff officers and a small staff, and a wireless organization consisting of seven forward links called tentacles (increased to nine in 1941, and later to twelve) for communication to the Control headquarters. These tentacles were given to forward infantry Brigades and Divisions depending on the perceived need for air support. The second element consisted of an RAF commander and a small staff, and a wireless organization with eight sets known as Forward Air Support Links. These sets were in theory to receive aerial reconnaissance intelligence and to control air support aircraft in the air, but initially were not used in practice. This was because “conditions of air superiority, and the degree of training of army commanders and staffs and of RAF formation leaders, were not at that time suitable to the decentralisation of control.” However, Coningham reversed this practice in 1942. In addition there were two wireless sets known as Rear Air Support Links for communication with RAF units on their landing grounds. The system was thus designed to order air support missions directly through the AASC, but was never used in this fashion. The AASC was regarded as a specialist communication network that notified the RAF of requests for air support and distributed intelligence, but was not used as a control.

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56 Ibid., p.59.
57 PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, p.44.
58 Coningham, op. cit., p.214.
60 PRO AIR 20/6130 Report by Air Marshal Sir T. Leigh-Mallory on his visit to North Africa, April 1943.
Changes in the method for delivering tactical intelligence to pilots also changed with experience. For example, at the start of the fighting in North Africa, bomb lines were denoted by military grid reference on maps, instead of using features on the ground. This was changed in early 1942, when the definition of a bomb line became "the estimated position of forward troops for the next two hours", and was to make use of ground features instead of the military grid reference.\(^1\) British ground units would send a description of the bomb line in code or Air Support Syllabic cipher with their request for support.\(^2\) Any change in bomb line was "passed to G(Ops) for information and correction of the operations map", but it was the GSO2 at AASC who was responsible for ensuring that the bomb line on the operations map was up to date and that appropriate Wings were informed of the change.\(^3\) In addition, ground units were also to send regular position reports to their Corps headquarters, and a scheme adopted in early 1942 called for movements in the forward area to be forecast two hours ahead and signalled hourly using the AASC.\(^4\) Delays in encoding or enciphering the bomb line, combined with delays due to inadequate or overloaded communications degraded the efficiency of the system and increased the possibility of attack on friendly troops by RAF aircraft, but in the context of improved

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\(^2\) Ibid.

\(^3\) LHCMA, Papers of Major General McNeill, memorandum entitled Air Support Control, 2 November, 1942; PRO WO 201/585, Air Support Demonstration, February 1943.

communication systems, these measures were an advantage over previous attempts.

In addition, in 1942, the flow of aircraft from Britain made the RAF superior in total numbers of aircraft, and the repair and salvage methods ensured that their operational numbers were vastly superior to their enemy. These aircraft could be provided only through a roundabout and dangerous process. During the fighting in the Western Desert, for example, the most common reinforcement routes were by shipping aircraft in crates around Africa to the Suez or Port Sudan, or by the Takoradi route. The latter was a 3,697-mile cross-continent route from Takoradi, a port in present day Ghana on the Gold Coast, to Abu Sueir in Egypt.65 During the first two years of the campaign, the best means for receiving aircraft was the Takoradi route. Indeed, it has been remarked that “victory in Egypt came by the Takoradi Route.”66 Such claims overstate the case, but it was an important element in establishing and maintaining RAF strength. In mid-1941, Tedder predicted the total number of aircraft arriving in Egypt from all of these routes would be “six hundred per month.”67 Although this estimate was somewhat optimistic, between 11 February 1942, and 10 March 1942, 410 aircraft arrived in

66 Guedalla, op. cit., p.192.
67 Tedder, op. cit., p.155.
Egypt through the various routes.®® RAF front line strength steadily grew, almost doubling between November 1941 and November 1942. Aircraft, however, were often lost along the Takoradi route, and it was the job of the salvage units to recover and bring them back to be repaired. They also salvaged aircraft lost in action. This difficult task paid handsome dividends in 1942. For example, during

one 17-week period of hard fighting in the desert more than 1,000 damaged aircraft of all types were scattered over some 100,000 miles of desert...But during that period more than 800 of them were brought back to the various base depots, repaired and made operationally serviceable and flown back into the war.®®

By mid-1942, three rear salvage units (one for bombers, one for British fighters, and one for American made fighters) were operating in the Western Desert.®® These fully mobile units conducted airworthiness inspections on incoming aircraft before passing them on to squadrons, "did minor repairs, engine changes and major inspections on squadron aircraft," as well as salvaging lost aircraft.®® In addition, one advanced salvage unit was formed from elements of the three rear salvage units for work in the forward area. Its main function was to locate downed aircraft, perform light repairs to enable them to be flown back to the rear repair and salvage units for more extensive repair. If this was impractical, the aircraft were either dismantled and taken back for collection by the

®® PRO AIR 23/6200 RAF Operations in the Western Desert and Eastern Mediterranean, 1942.
®® Ibid.
Base Shuttle Service, or in cases where damage was too extensive for recovery, the guns, certain instruments, and wireless equipment were removed to be used again, and to prevent the enemy gaining valuable technical intelligence.\textsuperscript{72}

Once salvaged, properly organised and supplied maintenance facilities were essential to repair and return aircraft to service. Each squadron possessed its own mechanics, an engineering staff, and equipment to perform maintenance and repair battle damage, but there were limits to their powers. Dawson established more elaborate maintenance facilities. They were adequately staffed and supplied, and were dispersed into protected locations to protect them from air attack. Engine repair facilities and other maintenance units, for example, were located in the Mokattam hills in the artificial caves created by the removal of stone to construct the pyramids at Giza.\textsuperscript{73} The whole system of repair and salvage was organised under number 206 Maintenance Group, created and commanded by Dawson. This arrangement ensured that maintenance and salvage would be given greater attention, and that RAF serviceability rates were better than their enemy's. Extraordinary measures like these ensured that RAF squadrons got every aircraft possible, and were able to maintain these numbers.

\textsuperscript{72} Ibid.
\textsuperscript{73} Air Ministry, RAF Middle East: The Story of Air Operations February 1942-January 1943, pp.34-35.
Supporting this system was the Air Stores Park, which ensured an adequate supply of fuel and spare parts to enable aircraft to be made combat ready. The Air Stores Park was organised into an advanced and a rear section. The advanced section was fully mobile to provide supplies to squadrons on the move, and the rear section was charged with ensuring the supply of the advanced section. A similar park was established to provide ammunition to squadrons, however the Air Ammunition Park drew its supplies from the railheads and ports, "and made convenient dumps according to operational requirements; squadrons drew from these dumps."  

Providing recovery and maintenance, as well as ammunition and supply, was extremely important to the ability of the RAF to deliver close air support in a cost-effective and continuous fashion, and showed how senior British commanders had become aware of what was required for effective aerial operations. Equally important were tactics that allowed munitions to be delivered on target and allowed the aircraft to escape without prohibitive losses to enemy fighters or anti-aircraft fire. By the middle of 1942, the RAF had come a long way with great speed in this area.

Apart from the moral effect of close air support operations, the British were interested in determining the material damage being inflicted

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74 Air Marshal Sir Thomas Elmhirst, "Mobile Air Forces," Journal of the Royal United Services Institute, Vol. 96 (1951). Elmhirst was responsible for organizing RAF units so they were more mobile, and better able to operate in fluid battles.

during operations. This made it possible to determine if the impact
was worth the cost, and guidelines were issued to pilots to help them
achieve a more accurate damage assessment. For example, a certain
criteria had to be met before a motorized transport vehicle was considered
destroyed. It had to be seen to burst into flames, explode or disintegrate,
receive a direct hit from a bomb, or be hit while moving at a high speed
causings a loss of control which wrecked the vehicle. If the vehicle
emitted black smoke or steam, or was hit by repeated strikes from a
cannon or machine-gun, it was considered damaged.\(^6\) A tank or
armoured vehicle could be claimed as destroyed if it was "seen to explode
or catch fire, emitting flames, as a result of a hit by a bomb or other
projectile".\(^7\) A tank was claimed as damaged if a heavy calibre bomb
missed but landed within approximately ten feet. An armoured vehicle
could be damaged by "a near miss (i.e. approximately 50 ft.) or by several
strikes by cannon or M.G. fire."\(^8\) Despite these criteria, pilots engaged in
operations were understandably inaccurate in their claims, and
photographic intelligence was employed to get a sense of the actual
damage inflicted during an operation. Before Rommel's Gazala offensive,
tactics had evolved to suit the new types of aircraft being received.

Fighters possessed the high speed and manoeuvrability necessary
to press home attacks at low level, allowing "sufficient surprise to

\(^6\) PRO AIR 23/1209, Organization and Application of Air Intelligence in a Tactical Air Force, 1942,
p.19.
\(^7\) Ibid.
\(^8\) Ibid.
counter light A.A. fire”. The approach to the target was made “from the direction of the enemy’s bases as this [gave Allied] fighters a quick getaway in the direction of friendly territory”, and often convinced Axis forces that the aircraft were friendly. When attacking troops, the fighter formation split in half, with one part acting as a decoy and a cover for the attacking aircraft, while the rest descended to ground level for the attack. The final approach to the target depended on the terrain. It was found that attacks in the line abreast formation were the most disconcerting to ground troops, providing the terrain would permit it. If not, the line astern formation was used, however such attacks were less troublesome and encouraged troops to fire at the lead aircraft "in the expectation of one or more planes flying into the zone of fire.”

When attacking a moving M.T. convoy, the fighter formation again manoeuvred into position for a surprise approach, with half the force covering the attacking aircraft who descended to ground level. The final approach again depended on the terrain, as it was best if the aircraft could approach perpendicular to the truck column. If so, each pilot selected a different vehicle to attack, and as it came into range raised the nose to gain altitude for a diving attack. The aiming point was right behind the driver’s cab to maximize the chance of killing the driver and

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80 Ibid.
81 PRO AIR 23/1281, Middle East Training Memorandum No.3, Report on Trials on Salisbury Plain 24th June, 1941.
destroying whatever was in the back of the truck. It was found that attacking at right angles to the direction of motion brought the highest possibility of setting the target on fire, whereas a frontal attack would only cause damage if the vehicle was empty. If the attack could not be made perpendicular to the column, however, a rough line astern formation was adopted and again each pilot picked a different vehicle. Dispersed vehicles were a difficult target because their irregular shape did not allow them to “be attacked equally well from any direction”. Worse, heavy anti-aircraft fire that increased losses was often encountered. Despite this, the pattern of attack was the same, with pilots approaching in line abreast, picking an individual target and firing at it.

Although troop concentrations and MT columns were ideal targets for ground strafing, some success was possible against armoured cars and some tanks, provided the correct tactics were followed. For example, a conclusion from exercise ‘Rommel One’ held on 3-4 February 1942 indicated that the best use of air power against armoured formations was to use fighters and fighter/bombers to stop the leading tanks, and then “use bombers afterwards to attack the concentrations thus formed.” It was also found that even moving tanks were easy targets to hit with machine-gun fire, but that aircraft were to "avoid

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82 Ibid.
83 Ibid.
attacking a tank from the direction towards which the tank guns are facing" as this presented a danger from the tank’s gunners. Surprise was also a critical factor. The easiest way to achieve surprise was for aircraft to approach out of the sun, using natural features as cover, or again approaching from the direction of the enemy’s own aerodromes. Attacking pilots were assisted by the noise generated by a running tank engine, which made surprise particularly easy to achieve. The best time to attack a tank or armoured car was when it was in the open (such as in the desert), or when it was climbing a steep hill as its speed was reduced and it could not turn. A pilot had to be conscious of the fact that he may receive "cross fire from every tank he [was] not attacking", and thus it was best to attack only "tanks on the flank or stragglers." The best method of leaving the target area was though a steep climbing turn, making the aircraft a difficult target for anti-aircraft gunners.

During ‘Crusader’ it was discovered that fighter/bombers could carry the same bomb load as many light and medium bombers, but were significantly faster and far more able to deal with enemy fighters. For example, the P 40 Kittyhawk was able to carry 2000 pounds of bombs a short distance despite the fact that it was never designed to do so.

Moreover, fighter/bombers were more cost-effective in terms of weight of

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85 PRO AIR 23/1281, Middle East Training Memorandum No.3, Report on Trials - Fighter v. Tank on Salisbury Plain 24 June, 1941.
86 Ibid.
87 Ibid.
88 Ibid.
armament delivered versus resources expended in the process. In one intensive day of work, the Kittyhawk fighter/bomber could fly three squadron missions a day for a total of 54,000 pounds of bombs carried to the target. The ground and aircrews required to accomplish this effort were 243, giving a factor of 222 pounds of bombs delivered per person involved. The Baltimore light bomber, by contrast, could fly two squadron missions a day for a total of 36,000 pounds of bombs carried to the target. This effort required 349 people, giving a factor of 104. The ease of maintenance and armaments loading of fighter/bombers as compared with light bombers, coupled with the ease with which fighter/bombers could be taxied and dispersed, resulted in their being able to fly three missions per day as opposed to only two with bombers. Fighters could be switched from an air superiority role to a close air support or interdiction role very quickly, allowing them to react rapidly (far more rapidly than light, medium, or heavy bombers) to incoming intelligence. Fighter/bombers were also much more versatile in the types of targets they could successfully attack, with the exception of targets requiring area bombing. Indeed, it was acknowledged in late 1943 that owing to the fighter/bomber's versatility, hitting power, and powers of self-defence it was the "most important single factor which consistently

88 PRO AIR 23/1826 The Characteristics, Limitations and Tactical Employment of the Fighter/Bomber - Some Comparisons with the Light Bomber, Senior Intelligence Staff Officer, Air Headquarters Desert Air Force, 13 April 1944, p.3.
80 Ibid.
91 Ibid., p.4.
contribute[d] to success on land."® Bombers proved less flexible in the close air support role, but were useful for continuing the attack at night.

Bombers, lacking the speed or agility of fighters, needed different means to accomplish their missions while avoiding enemy fighters and anti-aircraft fire. Bombers flew in close formations at medium altitudes to concentrate the strength of their defensive fire, and to present the "minimum area for fighter attacks."® These formations consisted of "a box of six, nine or twelve aircraft" each further separated into elements of three aircraft."® Although this protected bombers to a degree, they did not provide immunity from enemy fighters. B-17 Flying Fortresses in such formations over Germany without fighter cover suffered considerable losses to sleek, hard to hit German fighters. The bomber crews who flew close air support missions in North Africa, however, usually had fighter cover (which varied from eight aircraft to three full squadrons). Without such protection, the lightly armed Wellings and Marylands would have been easy prey for German fighter pilots. In fact, British fighter protection was so proficient that during the 1941 campaign in Libya, No.11 and 14 Squadrons "completed over 1000 aircraft sorties and did not lose one

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® RAFM Papers of Air Marshal Robb, AC 71/9/153, Memorandum on the Effect of Withdrawing Fighter Bombers from Tactical Air Force, from HQ, NWTAF, 29 December 1943.
® PRO AIR 23/1281 Middle East Tactical Memorandum No.10, Tactics Employed By Day Based Upon Experiences Gained Up To The Conclusion Of The Present Campaign In Libya, December 1941.
® Ibid.
aircraft as a result of enemy fighter action.” However, enemy fighters were not the only threat to aircraft.

The most deadly German anti-aircraft gun also doubled as an anti-tank gun. The 8.8 cm gun (more commonly known as the ‘88’) had a maximum vertical range of 32,500 feet (but its effective range was 17,000 feet) and could fire fifteen to twenty rounds per minute. More common, but no less deadly to RAF aircraft, was the 20mm light anti-aircraft gun. Intelligence indicated that these anti-aircraft guns were usually located on high ground surrounding defended positions. The maximum range of the 20mm gun was 7,000 feet, but again its effective range was "between 250 - 2,500 feet". Experience showed that bombing from “heights above 4000 feet provide[d] relative immunity from A.A. damage”, whereas fifty percent of the aircraft lost to anti-aircraft fire were lost below 2000 feet.

On occasion, bombers were required to conduct low level attacks, and faced anti-aircraft fire. This form of attack improved bombing accuracy and often achieved surprise, but at a price. In this attack, the aircraft never climbed above fifty feet, and used available topographical features to attain surprise - a difficult task in the desert. However, unless the exact position of the target was known, and the target itself was

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95 Ibid.
96 LHCMA MISC 26/5/4 Enemy Weapons Part IV German Infantry, Heavy AA and Divisional Artillery, published by the War Office in February 1943.
97 Ibid.; PRO AIR 23/1281 Middle East Tactical Memorandum No.8, Enemy Anti-Aircraft; PRO AIR 23/922 Operational Research Section Memorandum M.30, March 1942.
98 Ibid.
clearly discernable from low level, this form of attack was useless. Furthermore, unless complete surprise was achieved, heavy casualties from anti-aircraft fire could be expected. Consequently, the higher altitude attacks were preferred, and were more common.  

An example of a typical bombing mission came on 14 September 1941, when 12 Squadron South African Air Force was ordered to attack “dispersed enemy M.T....near El Hamra.” Eleven Maryland bombers were to fly the mission, with the first aircraft taking off at 1600 hours that day. Each aircraft carried eight-250 pound general-purpose bombs fused to detonate on impact. Aircraft from ‘B’ Flight were first into the air, and flew to “Sidi Haneish...at 4000ft to pick up fighter escort.” After a bombing run at 6000 feet, they returned directly to base. The six aircraft from ‘A’ Flight mirrored these procedures, and arrived on target ten minutes after ‘B’ Flight had left the target area. Cameras were carried to record the bomb damage.

This was an almost perfect mission in technical terms, but to little tactical effect. Light and medium anti-aircraft fire was encountered over the target, but no losses were experienced from anti-aircraft fire or enemy aircraft. Thirty-eight out of ‘A’ Flight’s forty bombs fell in the target area.

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100 PRO AIR 23/6485 Operation Order No.164 of 12 Squadron, SAAF, 14 September 1941.
101 Ibid.
102 Ibid; also AIR 23/6485 Operation Report 0.0.164 of 12 Squadron, SAAF, 15 September 1941.
103 AIR 23/6485 Operation Report 0.0.164 of 12 Squadron, SAAF, 15 September 1941.
104 Ibid.
causing two fires. ‘B’ Flight dropped forty-four out of forty-eight bombs in the target area, causing one additional fire. The Senior Intelligence Officer 12 Squadron SAAF, however, could not confirm any considerable damage beyond the three fires reported, and since the target vehicles were dispersed, probably just these three vehicles were destroyed. In order to achieve this result, the RAF expended eighty-eight bombs, the fuel for eleven Marylands and their fighter escort, and risked their loss. Thus, in this instance a tolerably capable C³I system allowed aircraft to locate and strike with efficiency a target, but because the aircraft were not particularly suited to the operation, no considerable damage was inflicted. At best, this was a marginally cost-efficient operation for the RAF.

Generally, even though the standard of bombing was good and often very “profitable results were reported”, bomber missions expended more resources with poorer results than fighter-bomber missions did. Any attempt to gauge whether close air support missions flown by bombers were cost-effective must be related to the supply situations of the Allies and their enemies. Since the Allies enjoyed more consistent and reliable supply shipments throughout the campaign than the Axis, an even expenditure of resources was to their benefit. Using bombers for

106 Ibid.
close air support in the desert was probably worth the effort, and many types were used throughout the campaign. Yet, bombers clearly proved less accurate and cost-effective than fighter/bombers in close air support, a lesson that shaped operations until 1945. The desert campaign was a testing ground for all aspects of close air support missions, and by mid-1942 fighter/bombers were conducting the bulk of close air support missions.107

Aircraft like the Hawker Hurricane I "Hurribomber" were fitted with hard points that could hold external bombs. The nature of the bomb load depended upon the target, and thus intelligence was important to success. For example, forty-pound bombs dropped from 1,000 feet and fused to explode on contact were found to be the best for attacking motorized transport convoys, whereas "the 500 Lb. G.P. or M.C. bomb [was] preferred" for attacking troops because larger bombs produced "better results than an equal weight of smaller bombs."108 Intelligence was also important to the selection of appropriate targets. For example, it was found to be preferable to bomb moving MT columns, while again dispersed vehicles were "not considered a profitable target" due to the irregular shape and heavy anti-aircraft fire.109 In either case, tactics were

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107 This assumption is based on the increasing number of fighter/bomber squadrons from late 1941 onward (see Richards, II, pp.385-390.) and their suitability to close air support operations (see Richards, I, pp.204, 228, and 260; PRO AIR 24/1080 Operations Record Book Appendices Middle East Air Staff 1942, 2 January 1942).
108 AIR 23/1281 Middle East Tactical Memorandum - Hurricane I - Bombing and Ground Strafing Tactics, 5th February, 1942, p.1; PRO AIR 30/129 The Tactical Aspect of Army Air Support, p.3.
evolved to improve the results of bombing attacks, while minimizing
the losses suffered.

Early in the desert war the procedure was for aircraft to approach
the target at between 7,000 and 9,000 feet, and then dive down to
3,000 or 4,000 feet to release their bombs. However, it was found that
this altitude was too high to achieve any kind of accuracy. The
procedure evolved so that aircraft approached the target at low level,
allowing “sufficient surprise to counter light A.A. fire”. Individual
bombs or salvoes were released over the target with the pilot allowing for
height and wind-drift. “Very little practice [was] required before
becoming adept in this method”, so few resources were wasted in making
a pilot proficient at this style of attack. The break away was
accomplished by flying as low and as fast as possible until well out of
range of anti-aircraft fire. Once out of range, aircraft could return to
strafe the target. Again, the ideal approach was made perpendicular to
the target’s direction of movement, in the case of motorized transport, in
line abreast formation. Depending upon resistance encountered, these
attacks could be continued until all vehicles were destroyed, or
ammunition was exhausted.

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110 PRO AIR 23/1826 The Characteristics, Limitations and Tactical Employment of the Fighter
Bomber - Some Comparisons with the Light Bomber, Senior Operations Staff Officer, 13 April
1944.
111 PRO AIR 23/1281 Middle East Tactical Memorandum No.9, February 1942, p.1.
112 Ibid.
113 Ibid.
Because fighter/bombers had some ability to defend themselves, fighter escort was only provided when enemy fighters were known to be operating in the target area, when enemy fighters were expected to be present, or near the end of a series of operations known as a "shuttle service" (a continual series of attacks against a particular target). Typically, six or eight aircraft were employed in any close air support or interdiction operation. When fighter cover was present, it flew between 500 to 1,000 feet above the fighter/bomber formation.

Fighter/bombers were employed in both interdiction and close air support missions with good results. For example, on 17 January 1942, three Hurricanes attacked MT on "NOFILLA-MERSA AUEGIA road, inflicting about 30 casualties on personnel, damaging 14 vehicles, and starting two fires." Similarly, on 26 January 1942, a formation of 10 Kittyhawks swept the Antelat-Msus road in a highly successful ground strafe in which twenty to twenty-five vehicles were destroyed and twenty personnel killed. Both of these missions were accomplished with no losses.

Thus, by mid-1942 all the factors necessary for the efficient use of air power were in place. In this area, the RAF had come a long way with great speed. Its operational air strength was dramatically greater than

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114 AIR 23/1281, Middle East Tactical Memorandum No.20, Notes on the Employment of Kittyhawk Bombers, 1942.
115 Ibid.
116 PRO AIR 24/1080 A.874, Operations Record Book Appendices Middle East Air Staff 1942, Message to Air Ministry, Whitehall from HQ RAF ME, 17 January 1942.
that of the Axis, it had aircraft well suited to the job, and tactics had evolved to maximize each aircraft's potential. Meanwhile, the RAF C\(^3\)I system had improved greatly since 'Crusader'. Organizations and personnel had achieved a level of competence that enabled them to receive, process and transmit intelligence with a minimum of delay, and to guide operations in real-time. Ultra and British 'Y' organizations were providing regular information on the German supply network, and on the deployment, disposition, and often intentions of the Axis forces. Tactical and strategic reconnaissance still suffered from a lack of coordination, but were able to guide both close air support and interdiction operations better than before because of the introduction of VHF R/T. This decreased the time needed to process aerial reconnaissance reports, and in most cases, the increasingly reliable reconnaissance reports would result in attacking aircraft arriving over the target in 30 to 40 minutes from the time of request for support.\(^{118}\) Once over the target, pilots were able to deliver damaging attacks against a variety of targets. Thus, planned or impromptu close air support was reaching the stage where it could directly alter the course of battle on the ground. The RAF stood ready to support the Eighth Army's next battle. Unfortunately, the latter proved unready to fight it.

During the spring of 1942, the Luftwaffe waged an all-out bombing offensive against Malta, the perceived thorn in the side of Axis ambitions

\(^{118}\) PRO WO 169/6638 War Diary of No. 2 AASC, 18 May 1942.
in North Africa. This allowed Italian supply convoys to cross the Mediterranean with impunity, and caused Churchill to put pressure on Auchinleck for an offensive. Rommel’s intelligence once again learned of British preparations, and he decided that the Afrika Korps should strike first.

Rommel planned to forestall the British assault by attacking and destroying the British forces in the area of Bir el Gubi – Tobruk – Ain el Gazala – Bir Hacheim, and possibly clearing the desert as far forward as the Egyptian border. The Eighth Army had adopted a static defence from the coast to the stronghold of Bir Hacheim, some forty-five miles inland. Extensive minefields covered the length of the line, but were more densely concentrated in the northern and central sectors. Further inland, British infantry brigades were grouped into several strong points, each of which “were provided with powerful artillery, infantry and armoured car units, and abundant supplies.” 119 British armoured brigades were positioned behind the line to aid the infantry in either attack or defence.

To call the British defences a ‘line’ was misleading, because few British forces were deployed on the forty-five miles north of Bir Hacheim, while the British left flank was open. Rommel believed that in “any North African desert position with an open southern flank, a rigid system of defence [was] bound to lead to disaster”, because the enemy could drive

around the open flank and deliver a ‘right hook’. This was exactly
what Rommel planned to do. The specific plan called for the Italian
Sabratha, Trento, Brescia, and Pavia Divisions to mount a diversion
towards Gazala, about halfway down the line to Bir Hacheim, while
Rommel led the Afrika Korps and the Italian XX Corps, consisting of the
Ariete Armoured Division and the Trieste Motorised Division, around Bir
Hacheim and the left flank of the British line. Once this was complete,
Rommel planned to turn north and engage the British armour while the
Italian X Corps drove a gap through the centre of the British line, through
which his supply columns could pass. The final phase of this offensive
was the destruction of the Tobruk garrison, and the capture of the port.
To accomplish these tasks, Rommel allotted merely four days.

The opening round of Rommel’s offensive worked quite well, and
on the opening day of the offensive, 26 May 1942, the Afrika Korps
passed Bir Hacheim very quickly. However, Rommel’s unrealistic plan
quickly produced a prolonged battle of attrition instead of a quick and
clean victory, and left his forces to fight it from a desperate supply
situation. The Italian Ariete division failed in its attack on the Bir Hacheim
strongpoint on 27 May, causing the Afrika Korps to be left without
supplies behind British lines. Worse still, the Trieste division failed to
create the essential supply corridors through the line. The failure of

120 Liddell Hart (ed.), op. cit., p.194.
121 Lewin, Rommel as Military Commander, pp.111-112.
122 Ibid., p.110.
123 Ibid.
Rommel’s plan left the Afrika Korps marooned behind British lines, and it could only be supplied by trucks carrying supplies around Bir Hacheim or by small parties crossing the minefields, providing ideal targets for the RAF. At this point the RAF ‘let loose the hounds’, and proved its ability to use the flexibility of its aircraft to good effect on a number of different targets with speed and power.

RAF fighter/bombers showed the destructiveness of aerial interdiction by taking “advantage of the lack of protective air cover for the enemy M.T. columns” and continuously attacking them. The Afrika Korps war diary for 29 May 1942 indicated the enemy had “evaluated the supply difficulties of the German spearhead correctly.” By means of RAF attacks and sorties of the French from Bir Hacheim, the supply transports intended for the Afrika Korps were dispersed. The attacks on the supplies intended for Rommel’s spearhead resulted in the destruction of 1050 motorized transport vehicles close to one third of the total Axis strength, during roughly one month in the Bir Hacheim area alone. Similarly, the repeated attacks by fighter/bombers engaged in close air support helped to bring the ‘Cauldron’, a defensive position where Rommel had gathered all his armour with its back to the British minefield, to the boil. Pilot reports told of tremendous confusion of vehicles being bombed, shelled,
and running onto mines. On 30 May 1942, two attacks by the fighter bombers, "operating from 6,000 feet but bombing from 1,000, were much remarked upon by our ground forces: both reduced some fifty or so enemy vehicles to blazing wrecks." Moreover, on 3 June calls for support to aid in the infantry attack against the east gate of Bir Hacheim were "answered with fighter-bombers who saw the [target] indicator put out and did much damage." Incoming intelligence, relayed to RAF commanders in real-time, allowed for a change of air policy. Later the same morning, the bombs were removed from the fighter-bombers and the focus switched to an anti-Stuka dive-bomber role, resulting in the destruction of seven Stukas in a single raid on Bir Hacheim. Later "strafing and bombing tactics were resumed and much damage was done in the area [southeast] of Hacheim." This policy was continued on the next day, prompting the signal from the Free French Garrison at Bir Hacheim "Bravo, merci pour le RAF", to which Coningham responded "Merci pour le sport." On 1 June, Tedder congratulated Coningham on his handling of his aircraft. He said "Your decision to give close support to the Army at all costs was right and has been fully justified by results."

129 PRO WO 169/6638, War Diary of No.2 AASC, June 3 1942.
130 Ibid.
131 Ibid.
132 Ibid., 4 June 1942; Coningham, op. cit., p.213.
133 PRO AIR 23/904 AHQ Western Desert Correspondence, Letter from Tedder to Coningham, 1 June 1942.
For the first time, British C³I allowed for the flexible use of air power against a number of different targets. At each phase of the fighting, the most immediate threat or profitable target could have the whole weight of RAF force thrown at it. Strategic intelligence allowed for an understanding of the Axis dilemma, and enabled the RAF to focus its operational intelligence gathering efforts. The changes to the communication system allowed operational intelligence to be rapidly passed to commanders who, in the context of all available intelligence, could make reasoned decisions on it. The admirable efficiency of the system was, however, still tied to the ability of the ground forces to fight effectively.

Air power, combined with British and Free French raids against Italian supply convoys passing supplies to the Afrika Korps across the minefields, had struck hard against the Axis weaknesses and prevented the enemy from deploying its strengths. Had the British army been able to hold its position at Gazala, the RAF certainly could have kept the pressure on supply and the exposed enemy concentrations, and bled the Afrika Korps to death. Yet the British lost.

The turning point in the battle came in early June when the British concluded that they could not continue the admittedly costly attacks on the Italian Trieste Division, the German forces in the ‘Cauldron’, and the German supply routes through Bir Hacheim, and abandoned that position and those raids. With this stroke, the British entirely eased the pressure
on enemy formations and supply, threw away their best and most
cost-effective way to maintain the initiative, freed enemy forces from a
desperate position, and allowed them to fight as they wished. Once this
happened, the British army was again unable to compete in a mobile
environment, causing retreat, confusion, and the inability of the RAF to
provide either close air support or interdiction with any effect.

Much of the responsibility for the failure at Gazala must be levelled
at senior British army commanders. Their inability to act quickly to
maximize their opportunities, or even to understand what they were,
allowed the initiative to pass to the Germans. At a time when quick
action was required to prevent a complete rout of the Eighth Army, British
commanders instead took hours to come to decisions that should have
taken minutes.\textsuperscript{134} That senior commanders took so long to make decisions
at such a crucial time, ran counter to the considerable effort directed at
improving the C\textsuperscript{3}I systems of the RAF and Eighth army.

In the midst of such confusion on the ground, once tolerable
wireless discipline and wireless communication broke down. This further
eroded the British ability to complete the ‘Boyd’ loop, as commanders
could not receive intelligence and issue appropriate orders. When the
decision was reached on 11 June for the Eighth Army to abandon the
Gazala line, Auchinleck ordered the Eighth Army to withdraw just twenty

\textsuperscript{134} Orpen, op. cit., p.268.
miles to the Acroma-El Adem-El Gubi line. However, Ritchie had already ordered the South Africans and 50th Division back to the Egyptian frontier, along with the remains of 2nd and 22nd Armoured Brigades. This supposedly orderly withdrawal immediately became a rout. During the Gazala battle, and the subsequent retreat into Egypt, the Eighth Army lost much of its equipment, and one of its most important supply bases at Tobruk.

The Eighth Army fell back into Egypt, until it consolidated its position at the El Alamein line. During this time failures on the ground forced the RAF to spend its energies evacuating their own airfields. Thus, once again the RAF could not provide much close air support, or continually attack Rommel's increasingly vulnerable supply columns. During the retreat, "from Gazala, when many units of the Eighth Army were in desperate straits, Coningham received only twelve requests for air support: all other attacks made by his squadrons were planned on information which they themselves had gathered." By the time it was ready to do so, the opportunity existed to employ air power to its full potential for the first time. The Germans were no longer able to engage in a war of manoeuvre, and the Eighth Army had a new commander who intended to adopt a new style of warfare, one better suited to his forces.

136 Pitt, Crucible of War: Year of Alamein 1942, p.82.
136 Ibid., p.80.
137 Richards, II, p.225.
The German victory at Gazala had, ironically, solved the British supply problem. El Alamein was right next to the British logistical centres in Egypt. As the Axis forces moved deeper into Egypt, conversely, their supply lines became perilously long, and increasingly exposed. Moreover, in order to mount this advance, the Axis had to reduce their pressure on Malta, which within a few months again served as the base for a sea-based attack on Axis logistics. This was alleviated somewhat by the capture of the port of Tobruk, and a sizeable amount of British supplies including

stacks of tinned beer, huts bursting with pure white flour, cigarettes, tobacco and jam; gallons of whiskey, priceless tinned food of all kinds; and tons of Khaki clothing...More important still, as Rommel’s staff soon discovered, considerable stocks of water and, above all, vehicles and petrol had escaped demolition.\(^{138}\)

Because the harbour facilities at Tobruk were in some disrepair and limited in size, their capture did not end the reliance on motorized transport supply columns from Tripoli and Benghasi, as the supply requirements of the Panzer Army exceeded Tobruk’s capabilities.\(^{139}\) Supplies unloaded at Tobruk had to be driven over 375 miles to reach the El Alamein line, those from Tripoli roughly 1300 miles, and those from Benghasi approximately 800 miles. As a result “thirty to fifty per cent of all the fuel landed in North Africa was wasted between Tripoli and the front.”\(^{140}\)

\(^{138}\) Macksey, op. cit., p.85.

\(^{139}\) Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*. (New York: Cambridge University Press, 1977), p.197; PRO AIR 20/7706 War Diary of Panzer Army Africa, memorandum from Army battle HQ to OKW Operational Staff, 1 August 1942.

\(^{140}\) Van Creveld, p.190.
Furthermore, the Axis forces had few vehicles to accomplish this task. The RAF's offensive, combined with normal desert wear and tear, depleted German M.T. stocks to almost nothing.141

As General de Guingand, who was shortly to become Montgomery's Chief of Staff, later put it, the failure to hold at Gazala enabled

Rommel to have a go at capturing Cairo and the Middle East base; but it also stretched his communications to the breaking point and, at the same time, allowed the Eighth Army and Desert Air Force to fall back on their supplies to end up like a coiled spring to be released at Alamein.142

Although this was the result, it was only through hard fighting, during which RAF close air support was a crucial element in its success, that the line was held at all.

During the crisis period in June and July 1942, when the possibility of losing Egypt was greatest, the entire RAF was devoted to supporting the army. All serviceable aircraft averaged seven sorties per day in an effort in which there "can be no doubt but that the RAF saved the Eighth Army."143 Indeed, Major-General L. H. Brereton, commanding a USAAF contingent attached to Coningham, wrote that "No account of the British stand which stopped Rommel can fail to record the fine part played by the RAF and the New Zealand Division...These two undoubtedly saved the 8th

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141 PRO AIR 20/7706, War Diary for Panzer Army Africa, memorandum from Army Battle HQ to German General at HQ Italian Armed Forces, Rome, 2 August 1942, also a memorandum from Army Battle HQ to Army General Staff Operations Department, 8 August 1942.
Army from complete defeat." The Western Desert Air Force’s fighters, fighter/bombers and light bombers flew continual and damaging close air support operations. As well as these daylight operations, two Fleet Air Arm Albacore Squadrons, Nos. 821 and 826, acted as pathfinders for the close support missions flown by No. 205 Group’s medium and heavy bombers by night. The result of this constant air assault struck heavily against the Axis advance, and forced Field Marshal Rommel to announce on 4 July 1942 that Panzer Army Africa was to go over to the defensive – only 80 miles from the main British naval base at Alexandria and only 170 miles from Cairo itself.

The retreat from Cyrenaica and desperate fight for Egypt itself hid improvements in the C³I systems and the ability to deliver close air support that had been shown in the Gazala battles. Indeed, it has been demonstrated that the system was working admirably from May 1942 onwards. Not only was Ultra beginning to provide regular and reliable intelligence on the German army in addition to that on the Luftwaffe, but prisoner of war interrogation and captured documents were exploited more fully and used in conjunction. Both army and RAF ‘Y’ continued to provide consistent intelligence on enemy order of battle and movements. Although photographic and tactical reconnaissance were not as focused as they would be during the battles at El Alamein, new procedures for

dealing with incoming intelligence minimised the effect of this. Thus, the force-multiplying effect of intelligence was being felt, and the force itself was much more competent than it had been. Previous combat experience enabled the RAF to design effective tactics for the increasing numbers of aircraft suitable for tactical air operations. These tactics had the effect of increasing the cost-effectiveness of close air support and interdiction operations by enabling aircraft to hit their targets hard and escape without excessive losses. The factor that was missing was a commander with the ability to bring all the elements together in an environment in which they would work. The environment was provided at El Alamein, and the person who brought it all together was Lieutenant General (later Field Marshal) Bernard Montgomery.
Chapter 4: Close Air Support During Alam Halfa and El Alamein

The El Alamein position had been consolidated after hard fighting, in which RAF close air support had proven its worth. The Alamein position made possible the static style of warfare that suited the British forces and their new commander. The static position made for better communication, and facilitated the control of subordinate formations.

When Montgomery took command, he chose to fight high intensity set piece battles with a continuous front. The Axis forces could only stand this approach if they could replace heavy losses of men and material, and get them to the front. However, they did not understand that the rules of desert war had changed, and that they would lose unless some way to counter Montgomery’s war against its logistic and material weaknesses was devised. This chapter will outline the changes to the British C^3I systems, their affect on the ability to deliver rapid close air support, and the effect of this close air support on the land battles.

To facilitate Montgomery’s plan the British adopted a series of deep defences whose flanks were, uniquely, anchored by virtually impassable obstacles. On the northern side was the Mediterranean. Any attempt to land amphibious troops behind British lines would be exposed to overwhelming air and sea attack. To the south was the Quattara depression, a salt marsh impassable to vehicles. Along the frontier between the two armies, the British prepared deep minefields.
Montgomery, commanding Eighth Army, and Alexander, the Commander-in-Chief Middle East, had decided that the Eighth Army was to fight and, if necessary, die where it stood. Montgomery made his position clear when he said on 13 August 1942 that the Eighth Army “will stand and fight here. If we can’t stay here alive, then let us stay here dead.”\(^1\) Montgomery’s own preference was to wear his enemy down and make use of the British soldier’s greatest strength - tenacity. Whatever might be said for or against this approach in general, at El Alamein it was perfectly suited to accentuate Axis weaknesses, and exploit British strengths. In such a position, the British were able to complete the ‘Boyd’ loop as fast, or faster, than their enemy, who often found that movement drew attack from the air. Air power thus removed mobility as an Axis trump card.

Supporting this plan, Tedder moved forward squadrons detailed for the defence of Egypt, and began using the bulk of No. 205 Group’s medium and heavy bombers on the night bombing of tactical targets located by reconnaissance and signals intelligence. This blended well with Montgomery’s intention to slow the pace of battle to suit the capabilities of the British forces, and force Rommel into a premature attack on his terms. This chapter will show that for the first time close air support was integrated effectively into the battle plans of the Eighth

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\(^1\) CAB 106/703 Address to Officers of HQ Eighth Army by General Montgomery On Taking Over Command of the Army, 13 August 1942.
army, which was finally able to fight the way it wished to against an enemy that was increasingly vulnerable.

After Montgomery took command of the Eighth Army, the relationship between the RAF and Eighth Army, which had been established under Auchinleck and Tedder, was formalized. The two services that Montgomery felt were “tending to drift apart” were reunited at a combined headquarters, and Eighth Army commanders were educated on the true functioning of air power. This was something Montgomery felt was seriously lacking. Once the battle of El Alamein had been won, tensions lessened, and senior army and air force commanders were able to express their ideas about the relationship that had existed between the British Army and the RAF since the beginning of the desert war. It was understood that the

soldier commands the land forces, the airman the air forces; both commanders work together and operate their respective forces in accordance with a combined Army/Air plan, the whole operations being directed by the Army Commander.-Air Marshal Coningham.  

As a result of lessons learned during operations, it was stressed as vital that the

commander of an Army in the field should have an air headquarters with him which will have direct control and command of such squadrons as may be allotted for operations in support of his Army. Such air resources will be in support of his Army and not under his command. - General Montgomery.  

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3 PRO AIR 23/1299, Air Power in the Land Battle, 1943.
4 Ibid.
With the important exception of operation 'Torch', these command arrangements, so important to the ability to deliver effective air support, came to govern cooperation between Allied army and air forces for the remainder of the war.\(^5\) This understanding prevented the dissipation of air resources into penny-packets, “with each packet working on its own plan”, which had been demanded by British and American armies during the interwar years and until 1943.\(^6\) By keeping the air assets united, they could be used with maximum efficiency, sometimes being directed quickly at fleeting targets of opportunity, or alternatively being used in one overwhelming blow. The alternative was a degradation of air strength. Since lower levels of command were never completely privy to all intelligence regarding enemy movements and intentions, and were naturally concerned with what was happening in front of them, they used their aircraft to deal with immediate threats, at the expense of overall efficiency. Keeping the air assets united, and controlled from a Headquarters that received in real-time all the available intelligence, allowed aircraft to be used in the most effective way possible. Indeed, in no other way could effective close air support or interdiction have been possible, nor could intelligence have helped them much, if at all.

\(^5\) The doctrine developed by the RAF and Eighth army in the desert was not absorbed by the rest of the RAF or the USAAF, and contributed to the failure of the exploitation of operation 'Torch'. Following this failure, both forces adopted the doctrine with aid from Tedder and Coningham.

\(^6\) PRO AIR 23/1299, Air Power in the Land Battle, 1943; Craven and Cate, op. cit., Volume One, Plans and Early Operations January 1939 to August 1942.
To enhance his ability to react to a changing situation, Montgomery made more extensive use of smaller headquarters during battle. Separate headquarters handled operational and administrative duties to avoid confusion and a communication overload. The advance headquarters handled operations, while the rear headquarters (often located far from the advance headquarters) took care of administrative requirements. Both the RAF and the army adopted this arrangement early in the war, although the army’s advance headquarters was termed main headquarters, and was capable of further subdivision. During operations, “Main H.Q. [could] throw off a Tac H.Q.”, consisting of just a few officers responsible for directing operations. Montgomery’s Tac H.Q. at El Alamein, for example, included himself and his two Aides de Camp, a GSO 2, two GSO 3s, and a signal officer. The Main headquarters was much larger, possessing a large operational staff, and was responsible for planning operations, as well as coordinating with other services. This structure continued to the end of fighting in North Africa, and combined well with the practice of issuing verbal orders instead of written ones. The result was an improved ability to complete the ‘Boyd’ loop more

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8 Ibid., p.150.
rapidly than before. This development was not lost on the Germans, who noted its effect.\textsuperscript{10}

Another important improvement in the army’s communication system was the introduction of a Staff Information Service, or ‘J’ service. This organisation, created by Hugh Mainwaring of Montgomery’s staff, intercepted signals from friendly forward units and relayed them to Army and Corps headquarters. Receiving wireless sets listened to “division, brigade, and armoured corps forward controls and broadcast the information obtained”, thus drastically reducing the time lag between the signalling of information from forward troops, and its receipt at higher headquarters.\textsuperscript{11} Montgomery felt that ‘J’ gave a higher commander a good indication of the fighting spirit of his troops and, incidentally, although this was not its prime purpose, it could also help by spotting obvious breaches of security. It had the overall effect of tightening the entity of the Army; bringing it closer together.\textsuperscript{12}

‘J’ helped to give Montgomery an understanding of his Army’s state, and helped to determine how the battle was unfolding. Knowledge of the state of one’s own forces was as important as good intelligence on the enemy, and by late 1942 the British had both.

\textsuperscript{10} PRO CAB 146/27 Evaluation of the British and American Commands and Troops in North Africa, 1943.
\textsuperscript{12} Ibid., p.138.
It was under Montgomery that Ultra also came into its own. In the opinion of Sir Edgar Williams, whom de Guingand attached to Eighth Army to focus the Eighth Army’s intelligence during Rommel’s Gazala offensive, under Auchinleck Ultra “never seemed to get put to any purpose.” This statement is unfair to Auchinleck, as it was not until July 1942 that Ultra began to provide a constant stream of useful information on the Afrika Korps. This came through the breaking of the Scorpion key used by air liaison officers attached to army formations. It was through this key that a more accurate and complete picture of Panzer Army’s intentions, order of battle, and state of deployment and supply was drawn than had been the case before. To this was added the decryption of a new army key known as ‘Thrush’.16

Under Montgomery, the increasing flow of Ultra material was used effectively to reconstruct both enemy dispositions and often intentions. For example, on 13 August Ultra revealed Mussolini’s pressure on Rommel to make “rapid preparations for a renewal of the offensive”. Moreover, the supply difficulties of the Axis forces were decrypted, as were the details of Rommel’s preparations and plans in a signal to OKH and OKW. In this appreciation, it was noted that enemy air superiority made a night attack necessary, and the only night with a full moon was

13 Bennett, op. cit., p.112.
14 Ibid., p.126.
15 Ibid., p.131.
16 PRO DEFE 3/770 MKA 2239, 13 August 1942.
17 Ibid., MKA 2094 and 2095, 15 August 1942.
26 August. Thus, Montgomery was aware of the enemy's intentions, its need for quick action, and the likely time and direction of the attack. This intimate knowledge of the enemy situation continued throughout the El Alamein battles, before which the British had access to the enemy's own tank, aircraft, and manpower returns. Intelligence personnel were sufficiently skilled to use other sources to confirm this intelligence, and changes to the intelligence system made this possible.

By the time of the battle of El Alamein in October 1942, army 'Y' was fully integrated into the operational intelligence process at Eighth Army headquarters. Once there, it produced such a flow of tactical intelligence about even the enemy's smaller units that it was often considered more valuable than Ultra. This realisation accounts for the dramatic increase in size of the Eighth army's 'Y' service, which had grown to 2,400 personnel by October 1942.

The RAF 'Y' units were 162 Squadron, which investigated enemy radar facilities using its own handful of aircraft, and the much larger 276 Wing that handled both W/T and R/T traffic analysis. 276 Wing came into being on 1 August 1942 to control the six field units existing in the theatre. This organization quickly expanded into ten mobile field units, two of which were placed, before Alam Halfa, under the operational
control of 211 Group RAF.\textsuperscript{23} The Fighter Group Control Centre at 211 Group was responsible for controlling all aircraft on missions, and having ‘Y’ units under the control of this fighter Group ensured the rapid transmission of any important intelligence to pilots.

Another significant change to the intelligence system took place in July 1942, when all reconnaissance units were gathered together under 285 Air Reconnaissance Wing. The objectives of the new formation were to “absorb all recce Units in the Western Desert”, and to direct and coordinate “recce policy so that duplication was reduced to a minimum and the maximum use made of the flexibility of the Air arm.”\textsuperscript{24} The Wing had its own headquarters, and controlled (both administratively and operationally) the Photo Reconnaissance detachment, Strategic Reconnaissance Flight, the South African Air Force’s survey squadron, the Middle East Interpretation Unit, and the Army Air Photo Interpretation Unit.\textsuperscript{25} In theory, 285 Wing also controlled the Army Cooperation squadrons; however, in practice they continued to receive direction from their respective Corps headquarters, and had small photographic interpretation sections attached.\textsuperscript{26} Despite this, and some unavoidable teething-pains, the new formation functioned smoothly, and reduced much of the duplication of effort. These changes marked the transition of

\textsuperscript{23} PRO AIR 40/2252 Mediterranean Air ‘Y’, 18 September 1942, p.2.
\textsuperscript{24} PRO AIR 23/6472 No. 285 Reconnaissance Wing: Report on Organization and Operational Methods from Formation Until the Conclusion of the European War, 1945.
\textsuperscript{25} Ibid.
\textsuperscript{26} PRO WO 277/34, Army Air Support and Photographic Interpretation, 1939-1945, p.4.
aerial reconnaissance from an unrefined to a relatively mature intelligence source. Both close air support and interdiction operations benefited from this development.

The changes to the air support system, as well as improvements in C^3I in general, combined with the static battlefield imposed at El Alamein. Tactical reconnaissance was increasingly reliable, as were reports from bomber and fighter sorties, and the ‘Y’ service was increasingly valuable in reconstructing the Axis order of battle and deployment. Moreover, signals intelligence was providing more consistent information on the strength, disposition, and supply state of the Axis armies and air forces than ever before. The result of this was an increased ability of the RAF to provide close air support and interdiction. In the context of a static battlefield, aircraft were easily able to operate over the front. Indeed, sorties routinely arrived over the target within thirty to forty minutes from the time of request, as opposed to an average of 3 hours during ‘Crusader’.

By the end of August 1942, improvements to the ability to provide tactical intelligence to pilots also decreased the likelihood that friendly troops would be attacked. Of particular importance was the use of Aldis lamps and coloured smoke to signal the location of friendly and enemy troops to attacking RAF pilots. When a formation was informed that air support was on its way, a code letter was assigned, and the troops would

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27 PRO WO 169/6638, War Diary of No.2 Army Air Support Control, 28 August 1942.
signal the appropriate letter to the lead bomber or fighter/bomber, in
addition to displaying ground strips and firing illuminating cartridges.
Also, coloured smoke was issued on a limited scale to be fired at the
target for close air support, and to identify friendly troops in case of
accidental attack by RAF aircraft. Coloured smoke was used because
standard white smoke was not easily visible in the desert, but it could not
be provided in sufficient quantities prior to El Alamein.28

The use of night bombers in a close support role during the fighting
at El Alamein kept continuous pressure on the Axis troops, but added a
new dimension to the problem of distinguishing friendly from enemy
troops. In response, night landmarks “in the form of an illuminated letter”
were used to guide Albacore and Wellington aircraft operating against
enemy concentrations located by intelligence.29 The AASC supplied the
letter to be used, as well as the period during which it was to be kept
alight, and the ground formation gave the AASC the location of the
landmark, which in turn passed it on to the appropriate Wing. Such
landmarks were to be “at least 1000 [yards] in dimensions with a flare
every 20 yards. The simplest way of making a flare [was] to fill a petrol
tin with sand and oil or petrol.”30

The effect of these measures was on the one hand to reduce the
likelihood that friendly troops would be attacked by RAF aircraft, and on

28 Ibid., memorandum entitled Ground to Air Recognition Signals, 23 August 1942.
29 PRO WO 169/6640 War Diary of No.5 Army Air Support Control, 21 July 1942.
30 Ibid.
the other hand to increase the probability that the attacking aircraft would find their target. Although none of these measures were foolproof, and required the active participation of all concerned, they worked tolerably well by August 1942, given the difficulty of the task. Although attempts in late August to use coloured smoke to direct attacking Hurricane IID’s from No. 6 Squadron SAAF onto “small parties of German tanks and Armoured Cars patrolling in the HIMEIMAT area” met with only moderate success, and there were still instances where RAF aircraft bombed and strafed friendly troops, the situation had improved.³¹ On the whole the measures must be counted a success, and reducing the instances of accidental attack by the RAF improved the relationship between the services and the perception of close air support amongst front-line soldiers and senior military commanders alike.

In late 1942, the RAF was the most important weapon in the British arsenal. By the time of El Alamein in October 1942, the RAF had roughly 1,200 aircraft, of which nearly 1,000 were operational.³² However, without effective intelligence and the system that allowed it to function, RAF operations would have been unfocused, inefficient, and ineffective. The British had travelled along a steep learning curve in a short time, and although there was no shortage of problems, the result was an instrument that would serve them well throughout the remainder

³¹ LHCMA, Papers of Major General McNeill 1/1, Intelligence summary for Period 30th August - 18th October.
³² Tedder, p.120.
of the war. The ability to make use of the flexibility of air power increased its destructive potential, and its cost-effectiveness. Intelligence was crucial to this ability.

The Luftwaffe, conversely, experienced a continual drain of its air resources in the Mediterranean to other theatres, particularly the Russian front when “most of the German air forces were withdrawn from the Mediterranean theatre for use in the east.” Looking back on July 1942, Field Marshal Albert Kesselring wrote:

What with the resurgence of British sea and air activity against Axis convoys and the restrengthening of Malta, particularly since the attack had to be abandoned, coupled with the ever-increasing demands on the Luftwaffe, German supremacy in the Mediterranean was gradually crumbling away. The Axis air forces consisted, by late 1942, of roughly 650 aircraft of which only 380 were operational.

Even at their worst, RAF serviceability rates were far better than those of the Axis, and during the battle of El Alamein, they reached eighty-five percent, a full thirty percent above typical Axis serviceability rates. By 24 November 1942, Axis serviceability fell to forty-nine percent, and the Luftwaffe had just thirty-eight single engine fighters in Cyrenaica, of which just twenty-one were operational. The RAF had

33 Ibid., p.293.
34 Ibid.
36 PRO AIR 40/1817 Marshal of the Royal Air Force Lord Tedder’s Despatch on Middle East Operations May 1941 - January 1942, section entitled German Numbers in the Mediterranean, April 1943.
37 Ibid.
also learned how to use their aircraft in a coordinated fashion, made possible by efficient C^l.

For example, on 1 September 1942, 7 and 127 Squadron SAAF provided fighter cover for three tank-buster Hurricanes engaged in close air support. Eight Hurricane II Bs of 7 Squadron provided medium cover, while 127 Squadron provided top cover. The fighter cover for bomber and fighter/bomber missions was deployed at medium and high altitudes to allow the interception of enemy aircraft wherever they appeared. This arrangement was far better than keeping fighter cover at one altitude. Aircraft at high altitudes could see enemy fighters farther away, allowing more time to plan an intercept. Similarly, if all fighters gathered at medium altitudes, the enemy could launch a diving attack, perhaps out of the sun. If every friendly fighter stayed at high altitudes, low flying enemy fighters could have intercepted the bombers or fighter/bombers before their attack. These arrangements were so effective that “the enemy rarely broke through [the] fighter escort”.

Such co-ordination of fighter cover with attacking aircraft was difficult and time-consuming, but essential. The adoption, by the desert air force, of a larger percentage of fighter/bombers eased the situation because fighter/bombers were simply fighters with external bomb racks.

Indeed, Air Marshal Coningham believed that every fighter should be a

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38 PRO AIR 26/22, War Diary of No.7 (SA) Wing: SAAF, 1 September 1942.
39 PRO AIR 23/1281 Middle East Tactical Memorandum No. 10, Tactics Employed By Light Bomber Squadrons By Day Based Upon Experiences Gained Up To The Conclusion Of The Present Campaign (Phase I) In Libya, December 1941, p.2 paragraph 5.
fighter/bomber, "with jettisonable tanks and bombs interchangeable". The main advantage to this was that attacking fighter/bombers and their escorts were located at the same base, requiring only one briefing for the entire attacking force. Moreover, the time required to organise the formation was substantially reduced, and because pilots flew both escort and attack missions, each understood the problems of the other. Again, merely knowing that fighters were covering the attack allowed pilots to focus on the attack.

Fighter cover was essential to all close air support operations, particularly for the Hurricane IID tank-buster because its 40mm cannon, each of which fired a 2lb. solid shot which could cut through tank armour, and a 20mm cannon used to sight the main guns, drastically reduced its performance. Moreover, effective results could only be achieved if certain procedures were observed. Intelligence from reconnaissance or other sources pinpointed possible targets, and would be passed along the AASC to the senior RAF officer at the joint Army/Air Headquarters for approval. If approved, the attack order was sent over the rear air support links. This procedure was streamlined with the introduction in September 1942 of 'J' at Army/Air headquarters tuned in to the Divisional net, with a liaison officer listening for potential "tank-

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40 Orange, p.145.
41 PRO WO/6640, War Diary of No.5 Army Air Support Control, 16 July 1942.
Ideal targets were tanks separated from their supporting motorized transports by more than half a mile. Attacks on a large number of isolated tanks achieved far better results than attacks on a few tanks supported by their motorized transport, as the flak encountered would be far worse in the latter instance.

The usual number of Hurricane IID's employed on a mission was either three or six aircraft, escorted by a "squadron of medium and high cover." Fighter cover was essential as "in no way can the IID be considered as a normal fighter, the extra weight carried, and the harmonization of its guns alone precluding this." Moreover, much of the pilots' attention was focused on map reading and navigation in order to locate the target. The formation adopted in the case of either six or three aircraft were loose three aircraft 'Vic' formations. The formation approached the target at 4000 feet, out of range of small arms fire and below the level of Bofors bursts. Speed was maintained at 180 miles per hour, but increased to 200 miles per hour when the target was sighted. Also, altitude was reduced to 1500 feet, at which each 'Vic' would change to line astern.

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42 PRO AIR 23/1281 Middle East Tactical Memorandum No.21, The Operational Employment of the Hurricane IID, September 1942, also PRO WO 169/6083 War Diary of No.2 AASC, Appendix A, 23 July 1942.
43 PRO AIR 23/1281 Middle East Tactical Memorandum No.21, The Operational Employment of the Hurricane IID, September 1942.
44 Ibid.
45 Ibid.
46 Ibid.
The final approach to the target was accomplished at fifteen to twenty feet above the ground and at 240 miles per hour. When the leader turned into the target, the formation turned inside him and formed a loose echelon formation, with each pilot selecting a different target. Each pilot began firing with all guns at roughly 700 yards, and continued to roughly 200 yards. Using this procedure, an experienced pilot was "able to get in 2-3 shots with each gun before pulling out," as each burst from the cannon deflected the aircraft downwards by 2 degrees, forcing the pilot to re-aim between bursts. At 200 yards a weaving breakaway was performed to avoid flying splinters and anti-aircraft fire. Only if the tanks were isolated could more than one attack be made, otherwise the risk from anti-aircraft fire was too great.

The Hurricane IID proved to be an accurate and devastating anti-tank aircraft, but the airframe limitations posed considerable problems. The increased weight and drag from the twin 40mm guns seriously reduced the aircraft’s speed. This, in turn, prevented adding protective armour on the underside of the fuselage and around the engine. Consequently, the aircraft proved very vulnerable to anti-aircraft fire, or even small arms fire.

Unfortunately, because of heavy losses, the concept of an aircraft equipped with anti-tank machine-guns was dropped in favour of rocket

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47 Ibid.
48 Ibid.
49 Ibid.
firing fighter/bombers with their less accurate but more versatile armament. Tactics were developed and procedures instituted to pick suitable targets for attack, hoping to minimise losses, but losses tended to be high nonetheless. This was especially true when pilots ignored the standard operating procedures. For example, when tanks supported by their motorised transport were attacked, losses to enemy flak were typically 75% of the attacking force. The problem lay not in the concept of the aircraft, but in its specific design.

Indeed, the aircraft proved very deadly provided the right target was chosen and anti-aircraft fire was light. During the battle of El Alamein, for example, the Free French's advance to the Himeimat ridge had left their anti-tank guns bogged down in heavy sand. When counter-attacked by Axis forces using captured British armour on 24 October, a request for support was placed with 2 AASC. The target was accepted, and four Hurricane IID's of No. 6 Squadron SAAF and two from No. 7 Squadron SAAF were sent to attack. The target was identified and eight tanks were hit of which three were left smoking. Less than an hour later, another raid "was launched which resulted in damage to a further nine tanks, of which eight were Honeys and one a Crusader", with no loss of British aircraft. Rommel was very impressed with this operation, commenting that "every one of the captured tanks belonging to the

50 Ibid.
51 PRO AIR 41/50, The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.279.
Kampfstaffel had been shot up by this new type of aircraft." The effect was so dramatic that Rommel brought one of the 40mm shells to show Hitler and Goering. Rommel reported that the shells had penetrated the tank’s armour and had killed almost the entire tank crew. Goering responded that such a thing was impossible as the Allies “only know how to make razor blades”, to which Rommel responded, “We could do with some of those razor blades, Herr Reichsmarschall.”

In mid-1942 HQ RAF Middle East began conducting close air support by night as well as by day. It was felt that better targets would be found at night, because the Axis forces had been taught the benefits of dispersal by day, but had yet to take these measures at night. Consequently, "in his freedom from night air attack, and fearing night ground attack, the enemy...often [went] into large close leagers at dusk and rarely broke them before dawn." It was also felt that morale would be affected to a greater degree by night "mainly owing to a loss of sleep." Finally, little Axis air opposition or anti-aircraft fire would enable older or obsolete types to be used. By the time the British and Axis forces became engaged at El Alamein in August 1942, these suggestions had become a reality.

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52 Ibid.
54 PRO AIR 39/141 Suggestions for Direct Air Support By Night, circulated by Air Tactics HQ RAF Middle East, February, 1942.
55 Ibid.
Night bombing operations featured close cooperation between naval Albacore aircraft and No. 205 Group's Wellington bombers, and was made possible by improvements in the C^l system. Specific tactics were adopted to maximise the potential of these attacks. Albacore aircraft, acting to illuminate the target for the attacking Wellingtons, flew at 5,000-6,000 feet. Magnesium flares, which burnt on the ground and were difficult to extinguish, were dropped to mark the target, and coloured lights were fired to draw the attention of Wellingtons to targets of particular value. Routes "of approach and departure were marked by flare paths", and single parachute flares indicated the dropping area to the successive formations.

A report issued by Panzer Army Africa expressed serious concerns about the impact of these coordinated attacks. The material damage inflicted on these targets could be extensive. For example, in one night attack by Wellingtons and Albacores, fifty to sixty fires were started on a large concentration of troops and equipment. More important was the effect on enemy morale. It was noted that the "spirit of the troops was considerably depressed owing to the totally inadequate German fighter cover. Incessant night attacks in particular served to reduce the degree

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68 PRO AIR 20/7706 War Diary of Panzer Army Africa 28 July-23 October 1942 Memorandum on RAF Operations, 8 September; PRO AIR 41/50 Appendix 10, Advanced Air Headquarters, Western Desert Operation Instruction No.5, 21 October, 1942.
69 PRO AIR 20/7706 AIR 20/7706 War Diary of Panzer Army Africa 28 July-23 October 1942 Memorandum on RAF Operations from Panzer Army HQ Ia to Panzer Army Africa, 8 September 1942.
58 Ibid.
59 WO 169/6638 War Diary of No. 2 AASC, 30 August 1942.
of readiness for action of both officers and men.®° The constant attacks prevented troops, who were suffering from a lack of supplies due to land-based interdiction, from getting adequate rest, thus reducing their fighting effectiveness. The material losses were also a source of concern. In one night, the approximate casualties were 10 Officers and 100 NCOs and men killed, and 5 Officers and 300 NCOs and men wounded.®¹ Thus, the Eighth Army was finally in a position that could not easily be outflanked, and its overwhelming air superiority neutralized the Axis forces’ main advantage – its ability to manoeuvre and rapidly deploy. Moreover, attacking by both day and night, air power was eroding the morale of the Axis forces, something which interdiction made worse. Indeed, air power was quickly making Rommel’s position untenable.

Given Rommel’s personality, it was a good bet that he would continue his attack towards Egypt in August 1942, an assumption reinforced by intelligence about the poor state of Axis supply and Mussolini’s pressure for an offensive. Indeed, on 29 June 1942, Mussolini had flown to Derna to take command for the triumphant entry into Cairo.®² Ultra clearly revealed the German supply predicament, brought on by land and sea interdiction, and indicated that the Germans had to attack quickly or run out of petrol, ammunition, food, and water. Prior to the battle of Alam Halfa, Rommel’s German divisions were

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®° Ibid, also RAFM RAF Middle East Review no.1, p.28.
®¹ WO 169/6638 War Diary of No. 2 AASC, 30 August 1942.
®² Pitt, Crucible of War: Year of Alamein 1942, p.134.
17,500 men and 484 officers under strength, his transport consisted of 85 percent captured vehicles for which he lacked spares, his fighting equipment was 210 tanks under establishment, his ammunition was scanty, and the quality of his rations deplorable. Rommel was also physically unwell, and this undoubtedly clouded his judgement. He was a tired and sick man who was suffering from “gastric and nasal disorders, and a poor circulation. It was in a mood of desperation and despondency that Rommel made his final fling.”

After Montgomery’s first tour of the battlefield in August 1942, he correctly concluded that Rommel’s main effort would be towards the southern British flank, followed by the standard right hook in order to get in behind the Eighth Army. XXX Corps held the northern part of the line, with XIII Corps to the south. Despite recent promises of reinforcements, including President Roosevelt’s commitment to send some 300 Sherman tanks and 100 self-propelled guns from the United States, Montgomery had insufficient forces to hold the entire thirty-five mile front in depth. Consequently, XIII Corps on the left flank was under strength on the ground. This had been done purposely “in order to tempt Rommel wide out into the desert where he [used] more petrol.” Montgomery had pushed the 9th Australian Division forward, and thus risked involving the

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63 PRO AIR 20/7706, War Diary of Panzer Army Africa, Memorandum on the Situation regarding personnel from Battle HQ, 25 August 1942.
64 Lewin, Montgomery as Military Commander, p.55.
65 Playfair, III, op. cit., pp.278-279.
only available reserve in a potential defeat. Consequently, much
effort was devoted to ensuring Rommel attacked in the way Montgomery
wished. An entire department of the Eight Army Staff was devoted to
“confirm Rommel in the belief that his units would easily break through in
the south. A map was put in his way on which the main minefields were
omitted and bottomless quicksands were marked as negotiable by
vehicles.”\(^\text{67}\)

Montgomery intended to allow Rommel to break through the south
end of the British line, and then execute his right hook directly into the
main force of British armour that was dug-in at the western edge of the
Alam Halfa Ridge in hull down positions, roughly fifteen miles behind the
front line. Here 131 and 133 Brigades of the newly arrived 44 Division
could direct artillery, in addition to the fire from the protected British
tanks, onto Rommel’s advancing panzers.\(^\text{68}\) Montgomery’s intent was to
force a prolonged battle of attrition, to which all of his forces were
geread. He realized that a battlefield draw of this sort would be a
strategic victory for the British. By fighting in a manner suited to his
troops, Montgomery would force Rommel to increase the consumption of
his scarce supplies, while gaining little ground.

This provided an excellent context for both air interdiction and
close air support. In a prolonged and relatively static struggle,

\(^\text{67}\) Wolf Heckmann, Rommel’s War in Africa, (New York: Doubleday, 1981), p.311, also see
Michael Howard, British Intelligence in the Second World War, volume V., Strategic Deception,

\(^\text{68}\) Lewin, Rommel as Military Commander, p.154.
quantitative strength counted for more than quality, especially if that
quality depended upon mobile conditions. German quality was offset by
British numerical superiority and overwhelming firepower in the form of
artillery and the RAF. Interdiction enabled the British to deny the
Germans any increase in supply and limit their movement, thus making
easier the location of close air support targets. Ironically, the two types
of air attack that had competed for resources now combined in effect.
Interdiction took away the strengths of the German forces, reduced their
equipment and rations to a deplorable state, and affected both morale and
fighting ability. Close air support continued this attack by both day and
night, and the effect of these attacks was made worse by the poor
morale of German and Italian forces – a situation created by interdiction.
Indeed, the Battle of Alam Halfa “thoroughly tested the new air support
organization and demonstrated the use of air power in a ground action on
efficient and economical lines. It stands out as a landmark in the
development of air support during the war.” Tedder wrote to the Chief
of the Air Staff expressing his “complete confidence in Coningham’s
handling of a very difficult situation.” He went on to say that
Coningham had kept “his head extremely well and [was] adjusting his
employment of his forces hour by hour as the ground/air situation
change[d].”

69 AHB, Air Support, op. cit., p.81.
70 Papers of Marshal of the Royal Air Force Peter Portal, Folder 8, Letter from Tedder to Portal, 30
June 1942, quoted in Orange, op. cit., p.102.
71 Ibid.
Before and during the battle of Alam Halfa, the Desert Air Force also used its overwhelming air superiority to continue the withering and "continuous attack on the African ports and the coastal road through and along which Rommel's supplies were forwarded to the front." This weakened the whole offensive and prevented Rommel from exploiting any gains he made. The British forces, conversely, were a very short distance away from their supply centres, and thus had far more ammunition, fuel, and reinforcements than their enemy. In an assessment of the situation and state of Panzer Army Africa, Rommel pointed out the trend in RAF operations in the weeks prior to the offensive as focusing on "the German Army's supply system." The effect of this policy was to force the launch of an attack prior to September, and the most favourable time for the attack was deemed to be around 26 August. The RAF began its offensive nine days before the Axis by coordinated attacks on enemy concentrations and supply organization. These attacks delayed the enemy advance considerably, and the difficulties encountered as a result of air attacks very nearly caused Rommel to cancel the offensive.

Rommel's offensive commenced on the night of 30 August 1942, and unfolded according to the British plan. To aid in his offensive, Rommel had been promised emergency shipments of 500 tons of petrol a

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72 Lewin, Rommel as Military Commander, p.151.
73 PRO AIR 20/7706, War Diary of Panzer Army Africa, Assessment of the situation and the state of Panzer Army Africa on 15 August, 1942.
74 Ibid.
75 Ibid.
day, along with additional fuel to be sent on tanker ships from Italy.\textsuperscript{76} Neither of these promises was fulfilled, limiting the extent of the operation and forcing a shorter radius to the right hook.\textsuperscript{77} The Afrika Korps advanced slowly through British minefields, which were considerably thicker than had been anticipated. Indeed, the Afrika Korps was “attacking without its usual verve”, and neither speed nor surprise was possible, as the commander of the 21\textsuperscript{st} Panzer Division (General Bismarck) was killed by a mine, and 15\textsuperscript{th} Panzer Division’s commander (General Nehring) was wounded by an air attack.\textsuperscript{78}

Despite these setbacks, despite his knowledge that the British would be expecting his advance, and despite the Afrika Korps’ desperate shortage of ammunition and petrol, Rommel continued the attack. On 31 August 1942, he turned part of the Afrika Korps north, directly at the main strength of British armour, bogging down the German armour in a battle of attrition that he had desperately wished to avoid. Worse still, on 3 September, Rommel ordered 15\textsuperscript{th} Panzer Division to drive, unsupported, towards Alam Halfa Ridge. It made no progress against the fire from two brigades of tanks and “300 field and medium guns and 400 anti-tank guns.”\textsuperscript{79} For the first time in the desert, the Afrika Korps had been forced to fight as the British wished, and had been defeated by superior British

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\textsuperscript{76} Barrie Pitt, Crucible of War: Year of Alamein 1942, p.224.
\textsuperscript{77} PRO AIR 20/7706, War Diary of Panzer Army Africa, memorandum to OKW Operations Staff, OKH Operations Department, and German General at HQ Italian Armed Forces, Rome, 29 August, 1942.
\textsuperscript{78} Lewin, Rommel as Military Commander, p.157; PRO AIR 20/7706, War Diary of Panzer Army Africa, Daily Report from Panzer Army Africa, 31 August 1942.
\textsuperscript{79} David Hunt, A Don At War, op. cit., p.125.
numbers, a style of war which suited those numbers, the superiority of British artillery and close air support. Withering RAF interdiction operations aggravated this situation.

The strength of the RAF’s attacks made the overall situation for Panzerarmee Afrika untenable. The Afrika Korps’ War Diary reported the effect of constant RAF close air support attacks as having caused “considerable personnel and material losses...by continuous enemy night and day air attacks in strength. These attacks were not without influence on the morale of the German and Italian troops.”

Moreover, attacks on enemy supply columns had, by the evening of 3 September, reduced petrol stocks to “the equivalent of a run per vehicle of 100 kilometres over good going” - barely enough to withdraw to its start line.

In the face of overwhelming enemy air superiority, the German forces began to make a fighting withdrawal to their starting points. The Eighth Army let up on Rommel, primarily because Montgomery rightly believed that his troops would probably have been beaten in mobile operations against the Afrika Korps, and the effect of this on British morale would have been serious. The RAF, however, did not let up on the Axis. The strength of close air support operations by both day and night slowed the withdrawal to one that “took several days.”

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80 PRO AIR 20/7706, War Diary of Panzer Army Africa, memorandum from Army Battle HQ to Panzer Army Africa Ia, 2 September, 1942.
81 Lewin, Rommel as Military Commander, p.160.
82 PRO AIR 20/7706, War Diary for Panzer Army Africa, memorandum to Fliegerfuehrer Africa, 2 September 1942.
September, intelligence located the biggest concentration of enemy vehicles in the Ragil Depression, and RAF attacks dropped a total of 112 tons of bombs by 176 aircraft.\textsuperscript{83}

The link between intelligence and close air support operations can be clearly seen during the withdrawal from Alam Halfa. For example, during the night of 31 August, in response to photographic reconnaissance, an attack was launched against the German 3\textsuperscript{rd} Reconnaissance Unit covering the Afrika Korps’ withdrawal from Alam Halfa. Shortly before 21:30 hours, “8 parachute flares were dropped over the defence area...followed immediately by 6-10 bombs”, which set a fuel lorry on fire.\textsuperscript{84} The first formation was quickly reinforced by another wave that also dropped flares making the area “as bright as day.”\textsuperscript{85} The attack caused confusion, made worse as vehicles attempted to leave the area, only to be attacked by low flying fighter/bombers. The first two waves of attacks destroyed eighteen vehicles with direct hits. The attack was co-ordinated so that a new wave arrived just as the previous one was moving off, and the attacks lasted from “21.30 to 03.45 hours with a short respite from 02.00 to 02.15.”\textsuperscript{86} It started fifty to sixty fires.\textsuperscript{87} These attacks continued all along the front throughout the Axis offensive. On the night of 2 September 115 tons of bombs were dropped on enemy

\textsuperscript{83} ibid.
\textsuperscript{84} ibid., Report on the Bombing Attack on the unit carried out during the Night of 31 August/1 September, 1942, 3 Sept. 1942.
\textsuperscript{85} ibid.
\textsuperscript{86} ibid; PRO WO 169/6638, War Diary of No.2 AASC, 1 September 1942.
\textsuperscript{87} PRO WO 169/6638, War Diary of No.2 AASC, 1 September 1942.
concentrations that found a large proportion of their vehicles unserviceable in the morning.\textsuperscript{88} The considerable material damage inflicted was compounded by the disruption and lack of sleep afforded to the enemy. Combined with the effect of interdiction attacks that destroyed the necessities of fighting effectively or even surviving, the enemy was ground down both morally and materially. Indeed, most casualties during the offensive were thought to have been inflicted by the RAF. These totalled 570 dead, 1,800 wounded, as well as the loss of 50 tanks, 15 field guns, 35 anti-tank guns, and 400 lorries.\textsuperscript{89} By removing German mobility, the RAF had aided in the battle to a significant degree regardless of how many trucks, tanks, or troops were destroyed. Moreover, the mere presence of RAF aircraft over the battlefield diverted many German 88mm guns from their secondary use as anti-tank weapons to their primary anti-aircraft role.

Rommel was well aware of the effect of RAF superiority after the battle of Alam Halfa, when he wrote that

\begin{quote}
by using his air-power, the enemy would be able to delay our operations at will, both in the daytime and – using parachute flares – at night. For no man can be expected to stay in his vehicle and drive on under enemy air attack...This meant that our positions had henceforth to be constructed strongly enough to enable them to be held by their local garrisons independently and over a long period, without even the support of operational reserves, until reinforcements – however much delayed by the R.A.F. – could arrive.\textsuperscript{90}
\end{quote}

\textsuperscript{88} Liddell Hart, (ed.), op. cit., p.283.
\textsuperscript{89} Ibid.
\textsuperscript{90} Ibid., p.286.
He later reminisced, after the fighting in North Africa, that “British air superiority threw to the winds all the tactical rules which...had hitherto applied with such success. There was no real answer to the enemy’s air superiority, except a powerful air force of our own. In every battle to come, the strength of the Anglo-American air force was to be the deciding factor.”

The RAF had proven this during the battle of Alam Halfa.

Montgomery, who was not noted for his overt praise of the RAF’s role in the battle, also admitted that intelligence had shown that the RAF was “playing a great part in inflicting moral and material damage on the enemy,” and the continued offensive operations of the RAF and Eighth Army had reduced them to such a poor state that “a hard blow now will complete his overthrow.”

The Eighth Army, on the other hand, was growing steadily stronger, and by the middle of October had over 220,000 men, 1,351 tanks of various types, and clear air superiority.

Rommel’s forces, conversely, were significantly under strength. His panzer divisions had only 220 panzers between them, and most were older Mark IIs.

Supplementing this were some 340 Italian tanks, most of which were too light to be considered anything more than armoured cars.

His troops numbered roughly 50,000 German and 62,000 Italian troops.

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81 Ibid.
84 Pitt, _Crucible of War: Year of Alamein 1942_, p.248.
85 Ibid.
Captured enemy documents revealed that most units were desperately short of ammunition, water, petrol, and "according to a pencilled note at the end of these deficiencies 'Vor allem Brot': above all bread."  

The effect of close air support operations was increased by the RAF's land-based interdiction campaign, which also paid its highest dividends at El Alamein. It was this campaign, and not the sea interdiction campaign led by Ultra, which was responsible for the destruction of the bulk of Axis supply up to that point. During 1941, the Axis forces ideally required roughly 60,000 tons of supplies per month, although Rommel acknowledged that they could function with 30,000-35,000 tons. Only during November 1941 were supply levels significantly less than the Afrika Korps' requirements. During this disastrous month, only 29,813 tons, of 79,208 tons dispatched from Italy, arrived. This was, however, the exception, and the naval threat to Axis convoys was largely removed in December 1941, with the loss of Force 'K' to an Italian minefield.

The removal of Force 'K', and the aerial assault on Malta during the spring of 1942, allowed supplies to once again flow without much interference. From January to May 1942, 94.9 percent of supplies

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96 Ibid.
97 PRO WO 169/3802 GHQ, MEF Intelligence Summary No.604 13 October 1942 to 14 October 1942.
99 Sadkovich, op. cit., p.344.
dispatched from Italy were received in Libya, and at no time were the quantities received in Libya less than the minimum monthly requirements.\(^{100}\) From July-November, the story is the same. Of the 443, 648 tons of supplies dispatched from Italy, 331,146 tons arrived in Libya.\(^{101}\) Again, at no time did the amounts received fall under the amounts required. In fact, in only two months were the amounts received less than 60,000 tons.\(^{102}\) The British did not win the war of supply on the Mediterranean. Rather, they benefited from both interdiction and close air support during operation ‘Lightfoot’.

The battle plan for operation ‘Lightfoot’ called for a diversionary attack in the south by XIII Corps, while the main effort was in the north under XXX Corps and X Corps. XXX Corps’ infantry was to “blow a hole in the enemy defences to enable British armour to break through into the open desert beyond.”\(^{103}\) The armour was then to position itself astride the enemy lines of communication, and prevent Rommel’s armoured forces from interfering with XXX Corps’ “crumbling” operations against enemy infantry, followed by a breakout from the El Alamein position.

At 9:40 PM on 24 October 1942, the barrage of over a thousand guns signalled the start of the offensive. The German guns were silent as General Stumme, who had taken command from an ill Rommel, forbade

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\(^{100}\) Ibid., p.344.  
\(^{101}\) Ibid.  
\(^{102}\) Ibid.  
the “bombardment of the enemy assembly positions on the first night of the attack, on account of the ammunition shortage.” Furthermore, fuel shortage and the RAF prevented a concentration of armoured forces for a counter-attack, as movement used precious fuel and drew attack from the air. Instead, the Axis defences rested on a “fortified and infantry-held line”, in which 15th and 21st Panzer Divisions (the bulk of the Afrika Korps) were deployed at opposite ends of the line. The RAF thus aided the assault, forcing the Axis to separate its best units and preventing their concentration against an enemy which “was operating with astonishing hesitancy and caution” against which “a concentrated attack by the whole of our [Axis] could have been successful.”

The hesitancy and caution of the British was caused by the inability of the engineers of XXX Corps to clear the minefields, causing the whole advance to stall. Into the confusion that resulted, the Germans directed accurate anti-tank fire, destroying the lead tanks and creating a bottleneck. Despite having all the advantages, a poorly executed battle plan nearly cost the British the battle. At the end of 25 October, the British forces had not reached the objectives assigned for early morning 24 October.

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105 Liddell Hart, (ed.), op. cit., p.298, also p.305.
While Montgomery attempted to reorganize and renew his offensive, Rommel arrived to take command of the Axis defence. He immediately brought 21st Panzer Division north to lead a counter-stroke against the British armour at Kidney ridge. The attack, on 27 October, was met with fierce RAF close air support, as well as by the new six-pound anti-tank gun and superior numbers of British tanks, and was halted with the loss of one-third of the Axis tanks.107

The material losses inflicted on the Axis forces, through both interdiction and close air support, also took an enormous toll on the morale of the fighting troops. There were increasingly high rates of sickness, and the mood of the soldiers was one of defeat. The hourly RAF bombing raids and lack of supplies began “to produce serious signs of fatigue and a sense of inferiority” among the Axis forces.108 In one close air support mission on 2 November, 233 sorties were flown and more than 1,300, 250-pound bombs were dropped on enemy armour and MT in the Northern sector.109 So accurate and effective was the bombing and so rapid the communication between our forward positions and Air Support Control that on one occasion even before 3 Wing’s bombers had landed, a flash signal came through that as a result of that raid 200 enemy troops had surrendered.110

110 Ibid.
This message was later confirmed by a report from X Corps to Eighth Army. Indeed, the total weight of bombs dropped during the initial stages of the attack was considerable. An intelligence summary from Advanced Air Headquarters Western Desert reported that 239 tons of bombs were dropped in air support missions during the night of 23 October alone.\textsuperscript{111}

On 26 October, an Axis counter attack was broken up by RAF bombers, in which seven raids of eighteen aircraft each dropped over 200,000 pounds of bombs on a build-up of enemy armour located by tactical reconnaissance.\textsuperscript{112} The counter attack failed. This scale of attack was continued, with 352 tons of bombs delivered in preparation for the breakout from the El Alamein position – operation ‘Supercharge’ on 3 November.\textsuperscript{113} Such a continuous and large-scale aerial assault was a major influence on enemy morale, given their poor state of supply.

The effect of RAF air attacks was brought out clearly through prisoner of war intelligence. General von Thoma, the commander of the Afrika Korps captured on 4 November 1942, reported that in October “the total number of personnel who arrived numbered only six hundred, while fifty had been lost a day through illness and wounds.”\textsuperscript{114} There were also fifty to sixty cases of jaundice per day.\textsuperscript{115} In one instance, three Italian airmen were recorded discussing the effect of RAF close air support

\textsuperscript{111} Ibid., p.280.
\textsuperscript{112} LHCMA, Papers of Major General McNeill 1/1, Period 19 October to 3 November, 1942.
\textsuperscript{113} PRO Air 41/50, RAF Bomb Weights Dropped by Desert Air Force, 3 November 1942.
\textsuperscript{114} PRO WO 208/4202 First summary of information gained during the interrogation of General Der Panzertruppe von Thoma, p.2.
\textsuperscript{115} Ibid.
operations. It was remarked that several army officers were driven mad by the constant air attacks, and one of their comrades was sent back to ITALY because he got it into his head that he was a Spitfire. When he went before the medical board they said: “What is wrong with you?” And he said: “I am a Spitfire,” and made a noise like a machine-gun; when he passed anyone he swooped like a Spitfire and made a noise like a machine-gun.\(^{116}\)

The effect of constant aerial attack could thus be quite dramatic.

Montgomery, with assistance from both Tedder and Coningham, drew all the essential elements of effective close air support together during the Alam Halfa and El Alamein battles. The RAF and Eighth Army were welded together at a combined headquarters, and both forces came to understand the needs and capabilities of the other far better than previously. Intelligence became much better organised and integrated into operational planning, which facilitated the speed with which commanders could understand the military situation. The result was a vastly improved ability to apply a considered air plan, or to respond swiftly to calls for close air support.

It is no exaggeration to say that close air support played a vital role in the victories at Alam Halfa and El Alamein. In just under two years, the RAF had designed an admirably effective weapon that struck directly at the weaknesses of the enemy forces. Close air support and interdiction, the two types of operations that had competed for available air power,

\(^{116}\) PRO WO 208/4193 Interrogation of Italian Prisoners of War, I/S R.X. 126, 1942.
complemented each other once C^3I systems allowed. By making effective use of available intelligence, the RAF was able to remove the mobility of the Axis forces, and at the same time attack efficiently their vulnerable and strained supply lines. Indeed, because of Axis skill at dispersal it was only when “the enemy were attacking or being attacked by ground forces and were forced to concentrate that really good targets were offered” for close air support. Until these targets presented themselves, the RAF used its fighters and fighter/bombers against road supply convoys. With good intelligence, relayed to commanders in real-time, this effort could be switched to close air support very quickly. Improvements in RAF and army C^3I, combined with the slower pace of battle imposed at El Alamein, allowed the full weight of the RAF to be directed against the most appropriate targets with speed and power. On the one hand this constant aerial attack destroyed enemy morale, and on the other hand it accounted for a significant portion of the enemy’s material losses. The overall effect of air power was to remove the Axis forces’ advantages, and to turn them into an eggshell awaiting the hammer blow.

PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.20.

117 PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.20.
Chapter 5: Close Air Support During the Pursuit from El Alamein to Tunisia

The defeat of the Axis forces at El Alamein left British commanders to decide whether to pursue and encircle the remains of the Afrika Korps quickly, or to gather British strength for the long pursuit to Tunisia. Montgomery made plans for the former, but poor execution caused him to slow his advance, despite abundant intelligence on the appalling state of the Afrika Korps.¹ For example, on 10 November Ultra revealed that 15th Panzer division no longer had any serviceable tanks, and less than 1,200 men. The 21st Panzer division had but 11 tanks and roughly 1,000 men, the 90th Light Division had just 1,000 men, and the entire army had only enough petrol to move 150 kilometres.² Photographic reconnaissance and prisoner of war interrogation reinforced Ultra intelligence on the deployment and disposition of the Panzer Army. This type of intelligence was typical of the standard available to the British forces during the entire pursuit to Tunisia, but neither Montgomery nor Coningham were able to take advantage of the situation.

The prospect of a long pursuit across the desert forced British commanders to consider the serious logistical and organizational problems associated with doing so. How these problems were addressed affected the fighting ability of the British forces, and the degree to which close air support could assist these efforts. It is therefore necessary to examine

¹ PRO WO 169/647 Operation 'Grapeshot', 2 November 1942.
² PRO DEFE 3/783 QT 5794 and 5797 for 10 November 1942.
the C\(^3\)I organization, how problems of supply and deployment of both land and air forces were dealt with, as well as the hesitant but deliberate way in which Montgomery chose to use his forces. By doing so, the role of close air support will be illuminated, and the question of whether the overwhelming British air strength was used effectively will be answered.

Even before the second battle of El Alamein, Coningham and his staff had begun to plan for the advance in support of the Eighth Army. This plan, known as Operation 'Buster', was circulated on 11 October, and split the available air forces into two main components. Force 'A' was to operate in direct support of the Army, while Force 'B' was to protect the lines of communication against the expected reinforcement of the Luftwaffe, and to act as a reserve for Force 'A'.\(^3\) The Air Staff plan called for an advance to Tripoli with Force 'B' moving one stage behind Force 'A' as far as the Tobruk area "until communications as far west as Benghazi had been organised."\(^4\) This plan was put into effect on 5 November 1942, after the Panzer Army had begun its withdrawal.

The march from El Alamein to Tunisia by the Eighth Army and Coningham's fighters and fighter/bombers presented unique problems for maintenance personnel and facilities. To provide continuous maintenance during this advance, arrangements were made for the maintenance

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\(^3\) PRO AIR 23/1776 Advanced Air Headquarters Western Desert Operation 'Buster', 11 October 1942.

\(^4\) PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.361.
organisation to 'leapfrog' its way forward. Through this provision, the RAF maintained far better serviceability than their opponents.

As with all things in the desert, supply governed the composition of the air forces acting in support of the Eighth Army during this advance. Fighters and fighter/bombers were to be the chief component of Force 'A' because they could be deployed more easily and rapidly, required less maintenance and supplies than bombers, and were more versatile.® Added to this was the expectation that the Axis air forces would be strengthened in the face of a British advance.

The initial composition of Force 'A' was three RAF fighter wings, consisting of twelve squadrons of RAF fighters and fighter/bombers and one USAAF fighter/bomber squadron, augmented by the USAAF 57th Fighter Group with two fighter/bomber squadrons. These formations were under the operational control of 211 Fighter Group’s control centre, which received its direction from Coningham at Advanced Air Headquarters Western Desert.® Force 'B', also under the control of Advanced Air Headquarters Western Desert and 212 Group, operated two Hurricane wings, and two light-bomber wings to which was attached the 12th Medium Bombardment Group of the United States Army Air Force. In addition, one flight of 'tank-buster' Hurricanes was held at readiness to be used in the forward areas if suitable targets presented themselves.™

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® Orange, op. cit., p.114.
® PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.365.
™ Ibid.
This organization increased "the speed with which the RAF was able to operate from [landing grounds] as soon as they were captured", and thus optimised the ability to provide close air support. To enhance this ability, RAF airfield reconnaissance "parties travelled with leading troops and their supply convoys were given a high priority in the order of March", and had a W/T link to Advanced Air Headquarters and would report when new landing grounds were ready to be used. Indeed, the need to secure airfields for use by the RAF became a major factor in the determination of Montgomery's plans. He knew that the Eighth Army could not "fight successfully on land without the closest co-operation of the RAF", and this could not happen unless the army secured and protected aerodromes and landing grounds. One of his chief objectives during the pursuit was "to establish the RAF on forward aerodromes, and to use the air arm as [his] long range hitting weapon". To this end, Royal Engineers from Eighth Army were positioned forward to test for and clear airfields of mines.

An example of this in practice during the march to Tunisia "was at Hamreit when the New Zealanders detailed 2,000 fighting-men to pick

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8 PRO CAB 106/386 Appendix A to "Lessons from Operations for INT to take to U.K." Extracts of report by GSO I Eighth Army, 1943.
9 Ibid; AHB, Air Support, op.cit., p.75.
10 RAFM Papers of Air Marshal Robb, AC71/9/109, Air Power in the Land Battle - A Note by the Chief of the Air Staff, Air Ministry 1943, p.3.
12 AHB, Close Air Support, p.75.
stones and make a landing ground."¹³ Another example took place at Sedada, where the leading elements of the 7th Armoured Division took along a landing ground party to clear a new landing ground. They reached the site at dusk and by "9 o'clock word was received that a landing strip was ready. Two squadrons of fighters, escorting a transport plane with the necessary RDF and immediate requirements, landed."¹⁴ By the following morning, two new landing grounds were operating some forty miles ahead of the first one. This continual work allowed the fighters and fighter/bombers to have the potential to operate over the leading elements of the army. As was previously the case, however, the ability to deliver close air support depended upon the skill of army commanders and their ground forces; interdiction could be conducted without close coordination with ground forces.

The system for delivering close air support was in place and the RAF aircrews possessed sufficient practical experience to conduct damaging operations, provided this ability was focused correctly. During the battle for Mersa Brega - El Agheila of 13-17 December, for example, 2/5 AASC operated twelve tentacles. Three tentacles were allocated to XXX Corps headquarters, two to 7th Armoured Division, four to the New Zealand Division that was spearheading the operation, and three to 51st Division.¹⁵ Ground to air recognition signals were worked out, and coloured smoke,  

¹³ RAFM Papers of Air Marshal Robb, AC 71/9/109, Air Power in the Land Battle – A Note by the Chief of the Air Staff, Air Ministry June 1943, p.4.  
¹⁴ Ibid., p.5.  
¹⁵ PRO WO 201/572 Plan for the Agheila Battle, 10 December 1942.
found to be so essential to close air support, was provided to mark
the targets. The bulk of the air support effort, however, was again
focused on providing reconnaissance and fighter cover over the advancing
troops against an enemy air force which rarely made an appearance, and
conducting interdiction and harassing attacks against fleeing enemy
columns.

Intelligence continued to be of vital importance to the effective
application of air power during the march to Tunisia. Since the beginning
of the war in the desert, intelligence had "been called upon to play a
much larger part in operations as a whole than it [had] previously had the
opportunity of doing." In a tactical air force, receiving and accurately
transmitting information on the ground situation was essential to keeping
pace with the battle, locating targets, and avoiding attacking friendly
forces. Indeed, at least "60% of the work of briefing and interrogation
[of aircrews] became concerned with the ground rather than the air
situation." During mobile operations, such as the pursuit after El
Alamein, the linchpin to success in this area was the intelligence staff at
all levels.

Some changes which assisted the sharing and flow of intelligence
between the army and RAF had been introduced as a result of experience
gained in the fighting at El Alamein. The most important of these was a

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16 Ibid.
17 PRO AIR 23/1209 Intelligence Organisation - Mobile Fighter Group, 30 May 1943, p.3.
18 Ibid., p.1.
closer liaison between the ALOs (of which there was an increase to two per Wing of four or five squadrons instead of just one) and the Wing Intelligence Officer. It was through these officers that intelligence was relayed between army and air force sources. Training courses were organized for intelligence officers to stress this with lectures being given by experienced ALOs and intelligence officers.19

The duties and responsibilities of intelligence officers at all levels had been more clearly defined, resulting in less duplication of effort. It was from Group intelligence, for example, that target intelligence and information about enemy flak installations was coordinated and disseminated, and reports of individual operations were gathered and assessed.20 At the Wing and Squadron levels, if the Wing was operating essentially as one unit with squadrons engaged on the same task, it was preferable to "draw in Squadron I.O.s and unite all intelligence, including briefing and interrogation, at Wing level."21 Where this was not possible, separate intelligence briefings were held at the squadron level, and even more inter-communication was required. Wing intelligence officers were charged with disseminating intelligence received from Group headquarters down to the squadron level. The duties of squadron intelligence officers were considerable, but did not change fundamentally throughout the war. His duties included the briefing and interrogation of all members of his

19 Ibid., pp.1-3.
21 Ibid., p.15.
Squadron before every mission and passing on intelligence received from Wing intelligence. He was responsible for maintaining the squadron intelligence files (including target maps), and instructing pilots on escape and evasion techniques and enemy tactics. Moreover, he passed an initial telephoned summary of mission results to the Wing Intelligence Officer and followed this with a detailed written report. In brief, the squadron intelligence officer linked intelligence and operations by providing pilots with all necessary intelligence. He therefore shared a tent with the squadron operations officer.22

The sources exploited by the British during the pursuit were the same as those at El Alamein; however, the difficulties associated with moving forward with the British forces, or supplying these forces with intelligence, put an additional strain on the intelligence system. Before examining the effect of close air support on the land campaign, it is necessary to outline the intelligence organisation, and to determine the practical degree to which the advance affected the ability of intelligence systems to function.

The standard of British intelligence remained high throughout the pursuit to Tunisia. The failure to exploit the success of the El Alamein victory is an excellent example of good intelligence, received in time to be of use, producing no results. In this instance, it was command at the higher levels, and not intelligence or communications, which was at fault,

22 Ibid., p.16.
showing the symbiotic relationship between them. Many historians have blamed Lt. General Lumsden, the commander of X Corps, for his failure to pursue the defeated Axis forces swiftly enough. They are correct to do so, but the ultimate responsibility lay with Montgomery as Army commander. However, against this criticism, one must remember that Montgomery’s actions during Alam Halfa and El Alamein had seen the destruction of the bulk of the Axis forces. Thus, his failure to act boldly had no serious consequences.

Ultra continued to provide excellent details about the supply state of the Axis forces, the number of operational aircraft and tanks, and very often their intentions. During the retreat, Montgomery ignored this excellent intelligence, which provided repeated opportunities to end the desert fighting with one swift blow. The reasons for his failure to act quickly to annihilate the shattered remnants of the Afrika Korps despite intimate knowledge of its state and intentions has been debated for years, but the most satisfying explanation for the failure to act boldly is that Montgomery was unwilling to behave in any way that risked even a remote chance of defeat. This is reinforced by Nigel Hamilton’s convincing assertion that Montgomery did not want to capture Tripoli, but rather thought Eisenhower’s forces should do so from the west.23 The Allied forces were much better poised to cut Rommel’s supply lines from

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Tunisia, and had "a short sea route to the ports of N. Africa; and they [had] a good railway and road system which stretch[ed] nearly to the Tripolitanian border." 

'Y' sources continued to furnish both operational and strategic intelligence. Throughout the advance to Tunisia, 276 Wing continued to operate ten mobile field units from the main centre in Cairo. This unit (as well as field units near Benghasi, Alexandria, Malta, and Syria) continued to monitor W/T traffic, or a combination of W/T and R/T, and was augmented by two other RAF field units monitoring R/T broadcasts in the Western Desert. Both RAF and army 'Y' continued to provide accurate information on enemy supply problems, order of battle, movements, and aerial operations. For example, on 2 November 1942 'Y' located the Afrika Korps' headquarters and principle formations, and intercepted orders for a counter attack by those formations. These orders had also been signalled using the 'Scorpion' Enigma key of Luftwaffe liaison officers, but the decrypted message was not forwarded to Eighth Army headquarters until after the counter-attack had taken place. This demonstrates the operational use of 'Y' and its complementary nature to Ultra, and also shows the sophistication of British intelligence officers who were exploiting a number of sources instead of putting all their eggs in the Ultra basket.

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26 PRO DEFE 3/782 QT 5032, 2 November 1942, also Hinsley, op. cit., II, pp.447-448.
The interrogation of prisoners of war continued to be an important source of strategic and often operational intelligence for the RAF and British army. Indeed, it was generally acknowledged that in the early phases of any new campaign, prisoner of war interrogation was "more accurate and more important than information obtained from [signal] intercepts." 27 The first hints at new weapons, radio equipment, and procedures were often brought to light through prisoner of war interrogation, and using this source often filled gaps in enemy order of battle. Long term planning for offensives owed a debt to the interrogation of prisoners intimately acquainted with the area in which the offensive would take place. 28 CSDIC Mediterranean, for example, received information from a prisoner code-named Bianco on the defences and troop locations around Tripoli. 29 In addition, information about the state of the enemy commander and his forces was also very valuable. After "the battle of El Alamein Rommel was a changed man, he was very pessimistic and he couldn't sleep...His health was bad. No more supplies came through, no ships, petrol didn't exist and there was a shortage of ammunition." 30

Prisoners also provided valuable information concerning the relationship between German and Italian forces. It is clear from numerous

27 PRO WO 208/3248 Notes on CSDIC Mediterranean, part 1.
28 Ibid.
30 PRO WO 208/4199 Extracts from German and Italian POW Interrogation Reports, Extract 9, undated.
prisoner statements that the German forces held their Italian allies in contempt. One statement, for example, indicated that it was "a custom when British soldiers [took] Italians P/W, to disarm them, spank them and then send them back to their own lines, as the British [could not] take the Italian soldier seriously." Another report stated that the "German soldier in Africa [used] only his right hand with which to fire his rifle, so that he [could] keep his left hand free to prevent his Italian comrade from deserting." Most important, however, was the steady and continuous information on the supply situation of the Axis forces, standard operating procedures, and the effect of aerial operations on Axis morale.

Another change to the British intelligence system was the fostering of a closer link between prisoner of war interrogation and aerial reconnaissance. Information gained from prisoners on such things as enemy deployment and intentions was checked through photographic reconnaissance, and photographs were then used during interrogations to gain clarification of what they showed.

Captured enemy documents revealed evaluations of British command and procedures which showed that although great strides had been made concerning the concealment of pre-battle preparations and signals security, large scale "operations were only undertaken when a clear

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32 Ibid., p.3.
33 PRO WO 208/3248 Notes on CSDIC Mediterranean Part1, Appendix III Notes on the Use of Air Photos and Photo Intelligence Material in the Detailed Interrogation of Prisoners of War.
numerical superiority in men and equipment was assured". During
the pursuit, moreover, at no time "did the British troops use their
advantages of terrain and numerical superiority to overtake their enemy.
If they did break through they were very rapidly halted and reorganised.
The pursuit developed into a methodical and absolutely safe following
behind a retreating foe." The combination of a lack of boldness on the
part of the British forces, tolerably good German tactical intelligence on
enemy disposition, and the dynamic commander of the Panzer Army,
allowed the Axis forces to extricate themselves from a number of
dangerous situations. This was despite overwhelming British air
superiority. Thus intelligence, though potentially valuable, was incapable
of influencing Montgomery's style of warfare.

The Eighth Army and the RAF's Force 'A' required a great deal of
operational intelligence, a large part of which was provided by tactical and
photographic reconnaissance. To facilitate this, 285 Reconnaissance
Wing, and the South African Air Force's (SAAF) 40 Army Cooperation
Squadron were "kept as close as possible to Advanced Air H.Q. Western
Desert" to provide such intelligence more easily. Indeed, during the

34 PRO CAB 146/27 Evaluation of the British and American Commands and Troops in North Africa,
Appreciation by Freemde Heere West, 18 May 1943.
35 Ibid.
36 Hans-Otto Behrendt, Rommel's Intelligence in the Desert Campaign, (London: William Kimber,
1985), chapter 5. In this chapter, Behrendt argues that although some sources of intelligence had
dried up, the Panzer Army was still able to conduct limited reconnaissance, and continued to have
some success against British signals traffic. Thus, they were able to determine British orders of
battle with considerable accuracy. The hesitancy with which Montgomery was operating,
however, continued to baffle the Axis commander.
37 PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and
entire advance to Tunisia, 285 Wing headquarters was never more than ten miles from Advanced Air Headquarters.

To provide tactical reconnaissance, 40 SAAF Squadron normally kept one flight of aircraft with one of the forward fighter wings. Initially, this was done because of a lack of landing grounds, but it greatly facilitated the provision of a fighter escort when necessary. During 318 sorties, the squadron lost six aircraft, three to enemy fighters and three by anti-aircraft fire. Despite the losses, the "system of broadcasting the results of the Tac/R’s over the Air Support Control Links proved very successful."^{38}

Strategic reconnaissance was provided by the Baltimore II aircraft of 1437 Strategic Reconnaissance Flight, and was used to trace the withdrawal and movements of the enemy forces.\(^{39}\) Intelligence received through other sources on enemy movements and concentrations was thus confirmed. This process was aided by 60 SAAF Survey Flight, recalled from the Delta in November 1942 to provide intelligence on the Mersa Brega defences, and later to confirm intelligence gained through prisoner of war interrogation and signals intelligence on the Buerat and Mareth lines.\(^{40}\)

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\(^{38}\) Ibid., p.467.
\(^{40}\) PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.467. Some important intelligence on the strength and deployment of the Axis forces at Mareth was gained through the interrogation of General von Thoma, see PRO WO 208/4197 German and Italian Prisoner of War Interrogation reports.
Number 2 PRU (newly equipped with Spitfire VDs) was responsible for providing photographic coverage of the battle areas and beyond for planning air and ground operations, photographing enemy landing grounds and harbours, as well as special targets requested by HQ RAF Middle East.\(^{41}\) The existing unit proved unable to handle these diverse and heavy demands, prompting a reorganisation in February 1943. The 2 PRU, and the flight of 69 Squadron based at Malta, were disbanded effective 1 February 1943, and 680 Squadron was formed, again under the direction of 285 Wing.\(^{42}\) The formation of this squadron brought with it more aircraft and support staff, which eased the overtaxed photographic reconnaissance system.

The composition of 285 Wing headquarters underwent changes to increase efficiency. On the operational side there was a Wing Commander and Squadron Leader with expert knowledge of tactical and photographic reconnaissance intelligence who acted as an advisory staff to the Air Officer Commanding on all matters pertaining to reconnaissance and its development.\(^{43}\) In this way, the problems associated with acquiring and assessing reconnaissance material continued to receive high priority.


\(^{42}\) PRO AIR 24/1662 Operations Record Book of Air Headquarters Western Desert, Administrative Instruction No.132, 23 February 1943.

\(^{43}\) RAFM RAF Middle East Review No.2, January to March 1943, RAF HQ Middle East, p.90.
It is clear from the initial performance of the British forces that senior RAF and army commanders did not envisage the complete collapse of the Panzer Army and Axis air forces, and gave no serious thought to acting quickly to seal its fate. This was despite the plans for operation ‘Grapeshot’ and the fact that the main goal for operation 'Lightfoot' was to "destroy the enemy forces opposing 8 Army. The operations [were to] be designed to trap the enemy in his present area and to destroy him there." The battles at El Alamein had largely destroyed the Axis forces, and this was revealed to Montgomery through a variety of intelligence sources. However, pursuing and trapping the retreating remains of the Panzer Army required the kind of rapid movement that the Eighth Army, and indeed British forces in general, found difficult. Montgomery’s desire to avoid a defeat, and his belief that Tripoli should be taken from the West exacerbated these difficulties.

For years after the war, Montgomery deflected criticism about the slow advance by blaming heavy rainfall. Montgomery’s Chief of Staff, Major-General Francis de Guingand, without acknowledging that the

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45 Stephen Hart in his article "Montgomery, Morale, Casualty Conservation and 'Colossal Cracks': 21st Army Group's Operational Technique in North-West Europe, 1944-45" Journal of Strategic Studies, Vol.19 No.4, 1996, argues that conservation of morale and avoiding unnecessary casualties forced Montgomery to build up his forces to a point where he could overwhelm his opponent. There is certainly an element of truth to this argument, but in the light of the excellent intelligence in Montgomery’s hands about the dismal state of the Panzer Army, (and the overwhelming British moral and material advantage) this argument is weakened. For if, as Hart argues, Montgomery’s style was to act to preserve his army’s morale only if he was ensured of material advantage, he certainly should have acted more firmly to destroy the remnants of the Panzer Army. Moreover, with such excellent intelligence in his hands, the best way to prevent casualties and ensure continued morale was to finish off his exhausted and poorly supplied enemy.
heavy rains should have affected the Panzer Army as well, echoed this weak defence. However, Montgomery was not alone in his lack of vigorous pursuit. The RAF also did not foresee the kind of situation that arose directly after the battle. The concentrated use of air power against the shattered remains of the Panzer Army still within range of the RAF’s existing bases might have caused "such demoralisation and congestion along the coast road as to leave them easy prey to the advancing Eighth Army." At times, the RAF was able to attack and temporarily stop the retreating enemy, but the Eighth Army was unable to capitalize on this action.

During the pursuit, the RAF’s fighter force was to provide air cover over the advancing elements. Using air power in this way was contrary to the doctrine developed during two years of fighting, and was in violation of Churchill’s orders. Focusing on air cover, despite intelligence showing ample targets, was doubly useless because it prevented the destruction of the remaining elements of the Panzer Army and had RAF pilots engaged in fighter patrols against a non-existent enemy. Ultra revealed the dismal state of both the Axis air forces and the Panzer Army, and provided complete details about the failure to reinforce the Luftwaffe. The continuation of air cover in the face of this detailed and reliable knowledge is difficult to defend.

46 PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia July 1942-May 1943, p.399.

47 JRULM Papers of Field-Marshal Sir Claude Auchinleck, Item 304, Note by the Prime Minister to the Chief of Staff Committee, 29 August 1941.
Thus, the blame for the failure to act must be shared with the RAF command. The price of equal status with the army was a share of the responsibility for failing to see the best use of the RAF's resources. It is clear that RAF commanders also failed to pay heed to the abundant intelligence on the deplorable state of the Panzer Army, and thus played their part in the failure to turn victory into annihilation. The emphasis was placed on getting "the fighters right forward quickly in long bounds and not on the final sledgehammer offensive from the air which would bring the last remnants of the Panzer Army to a standstill before they had managed to make good their escape from Egypt."\(^{48}\) The close air support system was functioning well, and would have been able to assist in the encirclement and destruction of the Panzer Army. Indeed, following the defeat at El Alamein, Hitler forbade Rommel to retreat from the area, ordering that he "show them no other road than that to victory or death."\(^{49}\) However, reality dictated otherwise, and the Panzer Army soon retreated to Fuka, but had no intention of holding this position. Ultra and photographic reconnaissance revealed this to Montgomery and Tedder, but decisive action was not forthcoming. However, the RAF was still within range of the retreating forces.

Although close air support was available, the failure to act boldly to destroy the retreating Panzer Army rendered it irrelevant. However,

\(^{48}\) Ibid., p.368 Air Officer Commander-in-Chief's despatch of 5 November 1942.
\(^{49}\) Liddell Hart (ed.), op. cit., p.321.
tactical air power remained the most effective weapon the British possessed. Since there were few instances where the British forces acted quickly enough to force battle, the type of tactical air power employed cannot correctly be called close air support even though air power was being directed at the enemy's main forces. A more accurate classification would be battlefield air interdiction and interdiction against supply. But the mechanisms and requirements were the same - air power still relied on efficient C^3I in order to function.

Despite focusing much of its attention on providing air cover for the slowly advancing Eighth army, the RAF continued to attack Axis ground targets located by intelligence. During the night of 4 November, for example, fifty-two Wellingtons from 205 Group conducted seventy-three sorties against enormous quantities of motorised transport illuminated by Albacore aircraft from 201 Naval Cooperation Group in Alexandria.\(^50\) These attacks continued by night and caused considerable moral and material damage to the shattered remnants of the Panzer army. On the night of 5 November, 205 Group dropped 150 tons of bombs on the retreating enemy columns, causing several direct hits and starting some thirty fires.\(^51\) This was augmented by number 73 Squadron's night-flying Hurricanes, which strafed hundreds of troop-carrying lorries on the roads near Garawla-Fuka area.\(^52\) Despite the slow advance of the Eighth army,

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\(^50\) PRO AIR 25/816 Operation Record Book for 205 Group, 4/5 November 1942.
\(^51\) Ibid., 5/6 November 1942.
\(^52\) PRO AIR 27/631 Operational Record Book of No. 73 Squadron, 5/6 November 1942.
Rommel felt that overhead "the R.A.F. reigned supreme, flying one attack after the other against every worthwhile target." It was this pressure, and the size of the Eighth army in pursuit, that kept Rommel retreating.

The work of the LRDG, and both tactical and strategic reconnaissance, located choke points such as the Halfaya and Sollum passes where Axis vehicles had to slow in order to negotiate the pass. RAF aircraft of all types then attacked the forward vehicles at these points, and succeeded in halting the forty kilometre-long column, providing ideal targets for air attack. This action also provided an excellent opportunity for the Eighth army to catch and destroy the remainder of the Panzer Army. The RAF was in good position to provide close air support to assist such a move, but the opportunity was missed.

During the retreat through the Sollum pass, the speed of the enemy withdrawal worked to their advantage by moving its vehicles out of range of the Fleet Air Arm’s Albacores, forcing the Well­ingtons from 205 Group to illuminate their own targets. Moreover, the RAF did not disrupt the withdrawal by bombing the pass itself. On 10 November the Axis forces blew a huge crater in the road at the foot of the Sollum Pass, causing considerable delay to the advancing Eighth army. Two aircraft from 104 Squadron were carrying 4,000-pound bombs that would have been

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suitable for damaging the road in front of the retreating columns.\footnote{PRO AIR 27/821 Operations Record Book of 104 Squadron RAF, 10 November 1942.}

However, despite another missed opportunity, the RAF did inflict significant damage to the retreating enemy. On the night of 7 November, 44 Wellington and 8 Halifax bombers dropped 86 tons of bombs in just under five hours, scoring twelve direct hits and starting thirty fires.\footnote{PRO AIR 25/816 205 Group Operational Summary, 7 November 1942.} The effect of these attacks took its toll on morale and material, and the "incessant attacks of the R.A.F." slowed traffic to a crawl.\footnote{Liddell Hart, ed., op. cit., p.345.} It was not slowed sufficiently, however, to allow the Eighth Army to catch up.

This pattern continued during the withdrawal into Cyrenaica, with fighters covering the forward troops and flying occasional harassing attacks, and Wellington and Halifax heavy bombers flying by night against retreating columns. Ironically, the tank-buster squadrons were left in the rear despite a plethora of suitable targets, and an enemy so disorganised as to be unable to mount any significant air defence.\footnote{PRO AIR 27/95 Operations Record Book of No. 6 Squadron RAF November 1942.} Although the RAF was sufficiently mobile often to lead the advance, the direction of the air attack was only partially successful, and the ground forces were unable to act swiftly enough to put an end to the enemy. Rommel continued to offer a brilliant rear-guard action, and was able on occasion to convince the British that he intended to stand and fight. Despite intelligence that told the British that this was not his intention, Montgomery and the RAF fell for this bluff and built up their forces for such battles.
In addition to these harassing attacks, interdiction against supply by land and sea added to the enemy's desperate supply difficulties. By 6 November, 15th Panzer Division was desperately short of fuel and more importantly water, as the "water supply installations at Mersa Matruh were blown up before the combat troops arrived." Unlike the situation before El Alamein, however, land-based interdiction operations were greatly assisted by the Ultra-driven sea interdiction campaign against Italian merchant traffic from Italy to North Africa. In November 1942, the supplies landed in Libya were sufficient to cover the needs of the Panzer Army, but in December only 47.4% of the 12,981 tons of supplies dispatched from Italy arrived in Libya. Land-based interdiction accounted for the poor state of the Panzer Army before December 1942, but after this point, aircraft from Malta and the Royal Navy took a leading role in the war on supply. However, even had all the supplies destined for Libya arrived, the amounts simply were not enough to meet the needs of the Axis forces, the result of too many Axis commitments.

Ultra and the LRDG provided information that suggested the Afrika Korps was intending to withdraw from the El Agheila area, and was moving the non-motorized Italian troops as early as 5 December, but Rommel was too short of petrol and motorized transport to withdraw the whole of the Afrika Korps. As with previous instances during the

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88 PRO AIR 20/7706 War Diary of 15th Panzer Division, 6 November 1942.
89 Sadkovich, op. cit., p.344.
90 IWM Bernard Montgomery Papers (BLM) 29/1 The Pursuit – 5 Nov. to 25 Nov., p.3; PRO DEFE 3/787 QT 7772, QT 7789, and QT 7903, 5 December 1942.
advance, quick action by the Eighth Army could have annihilated the remnants of the Afrika Korps, as it certainly had the advantage of numbers. The British forces had roughly 400 tanks and 200 armoured cars, whereas the Axis forces had only 80 tanks and 100 armoured cars.\(^1\) In the air, the story was similar, with the British possessing overwhelming air superiority.\(^2\) Moreover, the British forces, despite supply difficulties of their own, had a much higher rate of serviceability for these forces.\(^3\)

In typical fashion, and with abundant intelligence suggesting a different course of action, Montgomery slowly built up his forces for a set-piece battle, including provisions for close air support to assist the ground battle.\(^4\) Ultra repeatedly revealed the dismal state of the Axis forces. On 14 December, for example, the Afrika Korps had only enough fuel for fifty kilometres, and feared it would run out completely at Nofila.\(^5\) Fliegerfuehrer Afrika had similar difficulties, and was not expected to be able to provide any ground support against the British attack.\(^6\) Moreover, supply difficulties reduced the mobility of the Afrika Korps, which before Alam Halfa had been its key advantage over the Eighth army.

Ralph Bennett, a Hut 3 Duty Officer at Bletchley Park during the war and an historian of Ultra intelligence, has offered a defence of

\(^1\) PRO AIR 20/7701 VII/66 Air Operations by the 5th Squadra Aerea (Italian Air Force Command in Africa) Between October 20, 1942 and January 31, 1943 translated from the official war diaries.

\(^2\) Ibid.

\(^3\) IWM, Montgomery Papers 29/1, The Battle of Egypt, 1942; LC Carl Spaatz Papers I: 12 Special Report: The Air Situation in the Mediterranean Theatre, 7 January 1943.

\(^4\) PRO WO 201/572, Plan for the Agheila Battle. This plan included the allotment of tentacles to the forward troops, and the assignment of ground/air recognition signals.

\(^5\) Bennett, op. cit., p.177.

\(^6\) PRO DEFE 3/789 QT 8601, 15 December 1942.
Montgomery’s actions at El Agheila. In particular, he proposes the importance of a psychological block by veterans of the previous visit to El Agheila preventing them from advancing further, the admittedly thick minefields around Mersa Brega and a desire to avoid unnecessary casualties, and the difficulty of bringing up sufficient supplies to sustain a force large enough to encircle the Afrika Korps. The latter reason is the most defensible, as even the RAF demanded that significant supplies be brought forward along fragile lines. For example, on 28 November 1942, the RAF required 400 tons of supplies per day, but by 16 December 1942, this had increased to 1400 tons per day.\textsuperscript{67}

British supply problems forced Montgomery to attempt to break through the Buerat position and seize the port city of Tripoli. To accomplish this, Montgomery felt he needed ten days worth of ammunition, fuel, and other supplies. It took until 14 January 1943 to build up the necessary dumps, by which time Rommel’s aerial reconnaissance had forewarned him and he had already begun his withdrawal to the Mareth position in Tunisia. Once again, the trap failed to materialize. Tripoli was captured on the 24 January, but Rommel’s forces had yet to be completely defeated.

The performance of the British forces shows how the failure of one element in the C\textsuperscript{3}I system can cause the failure of the whole. During the pursuit from El Alamein to Tunisia, it was command that failed.

\textsuperscript{67} IWM Montgomery Collection BLM 29/1 The Pursuit – 5 Nov. to 25 Nov, p.3.
Montgomery’s initial failure to ensure that his forces moved quickly to seal the fate of the Panzer Army allowed it to escape, and then supply difficulties hampered attempts to force a final battle. Intelligence systems were strained by the mobile operations far from supply ports, but were functioning adequately to guide close air support and interdiction operations. Communication systems were also strained but no more so than their opponents' (and probably substantially less), and were sufficiently flexible to handle mobile operations. British signals security still left much to be desired; however the impact of this was mitigated by the inability of the Panzer Army to exploit the errors. Nevertheless, poor signals security did play a role in the reconstruction of British order of battle, and thus aided Rommel’s rear-guard action. Finally, significant effort was devoted to getting appropriate aircraft in a position to offer close air support, but poor use of these aircraft prevented them from offering much in the way of consistent support. Despite heroic efforts on the part of Air Marshal Sir Thomas Elmhirst, the man responsible for making RAF units more mobile, supply difficulties affected the degree to which RAF aircraft could operate during the advance. Although the Eighth Army’s strength had kept Rommel retreating, it was unable to complete the victory begun at El Alamein.

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88 Nigel Hamilton, The Making of a General, 1887-1942, p.20. Montgomery repeatedly lost touch with Lumsden, the commander of 10 Corps, the Corps de Chasse during the pursuit. After such an instance during the attempt to cut off the retreating Panzer Army at Fuka, Montgomery assigned Major Mather to act as a liaison officer to Lumsden, and equipped him with a special radio link to Montgomery's headquarters.
Chapter 6: Close Air Support During Operation 'Torch'

Within a week of the victory at El Alamein, Anglo/American forces, under the command of General Dwight Eisenhower, invaded Northwest Africa. Operation 'Torch' was the code-name for this operation which took place on 8 November 1942. However, unlike the battle of El Alamein where RAF close air support had proven to be an important factor in the victory over the Axis forces, it did not receive proper attention during the preparation of 'Torch'. The planning for the operation began in London during July 1942, by a combined British-American staff.¹ Neither the ground nor air forces from the United States, nor those from Britain had much in the way of close air support training. Indeed, the 33 U.S. Fighter Group that landed at Port Lyautey, for example, was trained for the air defence of the northeastern United States.² More importantly, neither the RAF nor the USAAF had absorbed the doctrine developed in the desert. The result was an inability of either the RAF or USAAF to provide close air support with any effect.

Part of the reason why the doctrine developed in the desert was not adopted by either air force was undoubtedly the repeated failures by the Eighth Army as late as four months before 'Torch'. This cast doubt on changes instituted by the Desert Air Force to the officially held doctrines. By the summer of 1942, the USAAF's Major-General Brereton

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¹ LHCMA, Papers of Major-General McNeill 1/2 A2, p.1.
was attached to Coningham's headquarters with two fighter groups and one medium bomber group from the USAAF, and was reporting to General H. Arnold on the importance of Coningham's doctrine for their employment in close support of ground forces. However, in the context of a perceived failure by those forces at Gazala, it is not surprising that little attention was paid. Moreover, the general impression of many officers about Brereton's competence may have influenced the reception of his reports. For example, Lieutenant General Omar Bradley later described Brereton as "difficult to do business with", and as someone who focused too much attention on finding the most comfortable surroundings for his headquarters. Even had Arnold fully accepted Brereton's reports, too much neglect of close air support for too long would have prevented it from affecting the planning of 'Torch'. Eisenhower's air advisors used the flawed FM 31-35 as their guide for the formulation of the 'Torch' air plan, and the British allowed them to do so.

This chapter will focus on the poor C^3I arrangements that accompanied the Allied forces to North Africa, and how this prevented the effective application of tactical air power.

The first battle of the Tunisian campaign was fought over whether to conduct the operation at all. The decision to invade North Africa was

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hotly contested by the American Chiefs of Staff, and in particular by the Army Chief of Staff, General Marshall. In 1941 and 1942, the British and Americans faced the possibility that the Red Army would be unable to resist further German offensives, something that demanded a second front to relieve the pressure. Marshall, preferring to invade France and resisting the dispersion of effort in other theatres, implemented the yearlong build-up of forces in the United Kingdom, code-named 'Bolero'. Marshall summarized his position in a memorandum to President Roosevelt in which he stated that

> Western Europe is favored as the theater in which to stage the first major offensive by the United States and Great Britain...Through France passes our shortest route to the heart of Germany. In no other area can we attain the overwhelming air superiority vital to successful land attack; while here and here only can the bulk of the British air and ground forces be employed. In this area the United States can concentrate and maintain a larger force than it can in any other. A British-American attack through Western Europe provides the only feasible method for employing the bulk of the combat power of the United States, the United Kingdom and Russia in a concerted effort against a single enemy.

The actual invasion which was to flow from the 'Bolero' build-up was code-named 'Roundup'. The competing plan, championed by Churchill, was the invasion of French North Africa, code-named 'Gymnast'.

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The Arcadia conference in Washington D.C. from 23 December 1941 to 14 January 1942, focused on these two competing ideas. Churchill voiced British plans, arguing "a campaign must be fought in 1942 to gain possession of, or conquer, the whole of the North African shore, including the Atlantic ports of Morocco." U.S. planners rejected 'Gymnast' because it required the cooperation of the Vichy French government, the invading force's lines of communications would be vulnerable, the lack of infrastructure in the theatre would slow an advance after the invasion, and the success of this operation would only indirectly contribute to victory. Furthermore, Marshall's senior strategic advisor, Major-General Stanley Embeck, added that the operation would be a poor staging area for operations against Europe and concluded that the acceptance of this plan would be a "mistake of the first magnitude."

Although this seemed to spell the end of 'Gymnast', Churchill never lost his enthusiasm for the plan, and was determined to convince the Americans of its soundness at a conference in Washington D.C. in June 1942. Over the objections of General Marshall, which included focusing on the Pacific to force a decision against Japan should the British insist on 'Gymnast', Roosevelt began to favour Churchill's plan. On 22 July, the

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11 Ibid, p.104.
12 Marshall, p.271.
British War Cabinet voted against any cross-Channel attack for 1942, and plans for operation 'Torch' (as 'Gymnast' became known) advanced.\textsuperscript{13}

Despite Marshall's opposition to the concept of 'Torch', once the decision had been made to conduct the operation, all possible support was thrown into the operation. The consequences of failure in the first American operation in the European theatre would have been far greater than the distaste of conducting an operation with which Marshall disagreed, although distaste there was. Arnold was irritated by the need to divert resources from the heavy bomber force in Britain to the African campaign, and in a letter to Marshall he estimated the chance of success of operation 'Torch' as less than fifty percent.\textsuperscript{14} Moreover, both Eisenhower and Patton felt that "the operation [was] bad and [was] mostly political. However, we [were] told to do it and intend[ed] to succeed or die in the attempt."\textsuperscript{15}

From the outset, the operation incorporated both British and American forces to ensure a smooth coalition operation. For example, there were "two Deputy Chiefs of Staff, one British and one American."\textsuperscript{16} Great pains were taken to select "American and British officers to fill key positions in the command and staff organizations" needed for the landings.\textsuperscript{17} Moreover, differences in the way each armed force operated

\textsuperscript{13} Ibid, p.277.
\textsuperscript{14} Arnold, p.321; LC, Arnold Papers, Letter from Arnold to the U.S. Army Chief of Staff, 19 August, 1942.
\textsuperscript{15} Blumenson, II, pp.81-82.
\textsuperscript{16} PRO CAB 106/1220 The Structure of A.F.H.Q., undated.
\textsuperscript{17} Eisenhower, p.75.
had to be addressed to avoid breaches of security and speed up communication. For example, the security classification systems used by American and British forces differed, presenting the possibility of distribution of sensitive material to a lower level than desired. All officers were instructed on these differences through a signal operation instruction issued before the departure of the convoys, the United States classification of 'Secret' equalled British 'Most Secret' and so on. Also included in this instruction was the classification of the importance of signals. American messages marked 'Urgent' equalled British signals marked 'Emergency'. Difficulties invariably resulted from different operating procedures, but these grew less as the forces gained experience working with each other.

From Allied Force Headquarters (AFHQ) General Eisenhower exercised overall command for both the landings and the exploitation afterwards by the British First Army. AFHQ was initially in Gibraltar, but soon moved to Algiers. From these headquarters, Eisenhower controlled all ground, air, and naval units taking part in the operation. He did so by issuing objectives to the representatives of these services, which in the case of the Allied air forces were General Doolittle and Air Marshal Sir William Welsh.

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18 NARA RG 331 AFHQ Box 73 Reel 24-C, Signal Operation Instruction United States - British Security and Priority Classification, 8 October 1942.
19 Ibid.
The general plan for 'Torch' called for a series of landings along the North African shore to seize desirable ports within the limits of Allied air power as a first step to the seizure of the French North African province of Tunisia. It was clear that Oran and Algiers would be key targets because of their port facilities, and because of the important airfields near both ports. It was decided, after much debate, to include an assault on Casablanca to secure the rear areas and lines of communication of the main advance. Intelligence showed that the Germans and Italians were expecting a landing further south in Dakar. American Office of Strategic Services (OSS) officers reinforced this perception, and the considerable security around the operation enabled it to be conducted as planned, with no direct interference from the Germans.

The Western Task Force (WTF), which sailed from the United States and was commanded by Major General George S. Patton, was to capture Casablanca and establish and maintain communications between itself and the Centre Task Force near Oran. It was also to build up ground and air striking forces capable of securing Spanish Morocco, and to deal...

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20 PRO AIR 47/13 Operation "Torch" (Plan "B") Air Appreciation by Air Marshal Sir William L. Welsh, 5 September 1942.
21 PRO AIR 20/7703 Memorandum to Army General Staff, Operations Division, from OKW Operations Staff, 17 October 1942.
with the estimated 57,000 French troops in Morocco. The troops assigned were the 3rd and 9th Infantry Divisions (less the Thirty-Ninth Infantry Combat team assigned to the Eastern Task Force in Algiers), as well as the 2nd Armoured Division, the 70th and 756th Tank battalions, the 603rd and 609th, and 702nd Tank Destroyer Companies, and the 36th Combat Engineer Regiment. Also attached to the WTF was XII Air Support Command under Major General Cannon, which was to join the ground forces at the captured airfields. From these airfields, the Western Air Command would operate 160 short-range fighters, 13 fighter-observation aircraft, and 15 light bombers within six days of the landings. Estimated French air strength was 74 Fighters, 81 Bombers, and 13 Reconnaissance aircraft.

Centre Task Force (CTF), sailing from Britain and commanded by American Major General Lloyd Fredendall, was to take Oran using American ground troops, transported and supported by the Royal Navy. The 37,100 U.S. ground forces were augmented by 3,600 British troops, and were to push inland following the landings to seize aerodromes around Oran, block the approaches to the area, and drive along the coast to capture the shore batteries. Facing the assault forces were roughly 16,700 troops of the Oran Division. Close air support for the operation

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24 Howe, pp.42-43.
25 Ibid., p.46.
was provided by carrier aircraft of the Fleet Air Arm, and by American
ground-based aircraft of the Twelfth Air Force based initially in Gibraltar
and commanded by General Doolittle.28

Assisting CTF in its landings was an AASC furnished by 12th Air
Force to receive calls from subordinate units. It had five Air Support
Parties (the units designed to filter and pass along requests for air
support) with leading units. The AASC transmitted missions approved by
the Commanding General of CTF to the Commanding General 12th Air
Force, once USAAF planes arrived at nearby airfields. Before this, the Air
Support Control Officer relayed all missions requested by the
Commanding General of CTF to the Royal Navy.27 Each ground division
headquarters had an Air Support Party (ASP) attached which would
receive requests for support from forward units. The ASP would request
approval from the Divisional commander who, if the request was valid,
would approve it and notify the ASP. The ASP would then contact the
Air Support Control (ASC) at Corps headquarters, which would seek the
Corps commander's approval. If that was forthcoming, ASC would be
notified and could then request the support from the Air Support
Command's aircraft.28 At the field army level, an air support command in

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26 Ibid., p.31; Eisenhower, p.91.
27 NARA RG 331 Records of Allied Operational and Occupation Headquarters, World War II, Entry
49A Box 8, AFHQ, General Staff, G-3 Section Operations Subsection, Center Task Force Plan
Annex 5 Paratroop Plan and Air Support Plan, AFHQ, General Staff, G-3 Section Operations
Subsection, September 1942.
No.4, July 1943.
contact with the army commander monitored the requests and
provided guidance if necessary. In practice, this system meant that
Corps commanders essentially had their own air force to call on when
they wished, often at the expense of overall efficiency.

After the successful capture of Oran by CTF ground forces, and the
subsequent capture of the airfields of Tafaraoui and La Senia, USAAF air
forces would fly in and begin operations. On the day following the
landings, 31st Fighter Group was operating from Tafaraoui, with 1st Fighter
Group operating from La Senia and 60th Observation Group flying from
Tafaraoui on each of the next two days. Within the next two weeks, a
further two Fighter Groups, two Bomber Groups, and three Transport
Groups were operating from airfields in the area.

The Eastern Task Force, also sailing from Britain but commanded
by Lt.-General Sir Kenneth Anderson, had Algiers and the airfields nearby
as its target, and contained both British and American ground forces. The
Eastern Task Force would eventually form the vanguard of the thrust
towards Tunis. An American assault force commanded by Major General
Charles W. Ryder, consisting of the 168th and 39th Regimental Combat
Teams, preceded this force. Once the landing objectives had been
secured, Anderson's forces would come ashore and begin plans for the
advance. Facing the assault forces were 16,000 troops from the Algiers

30 NARA RG 331 Records of Allied Operational and Occupation Headquarters, World War II Entry
49A Box 6, Air Force Annex to Administrative Order #1, 4 October 1942.
31 Howe, p.52, Eisenhower, pp.92-93.
Division and 13,000 in the Constantine Division, as well as the 7th Legion of Guards, an anti-aircraft regiment, and 1,200 other troops at Maison Carree, and an armoured force. The French had 52 Fighters, 39 Bombers, 20 Transport aircraft, and 2 Reconnaissance aircraft.

The provision for close air support accompanying the ETF consisted of an AASC and nine tentacles. Requests for tactical reconnaissance or fighter protection (the only two suggested uses for tactical air power) were made by the commander of either 34th U.S. Division or the British 78th Division, depending upon which formation was "in control of active operations at the time." The request was made to the RAF commander of the fighter sector at Maison Blanche when communications had been established, and would be accepted only if the air situation around Algiers permitted.

During the initial advance into Tunisia, the AASC was with the lead division, with tentacles at the battalion level. With the military build-up, the AASC moved to Corps headquarters, with tentacles down to brigade. Requests for close air support from field units were made through the tentacles to 7 AASC located at 78th Division headquarters, but later

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32 Howe, p.52.
33 PRO AIR 23/6560 Army Co-operation Plan, Operation "Torch", 5 October 1942; The initial landings were to be undertaken by American forces, to be supplemented by British forces if the landings were successful. The reason for the use of American forces was to limit the resistance of the French defenders. If the landings were British in character, it was felt the resistance would have been much greater due to the attack on the French fleet in Mers el Kebir by British forces in 1940, and the subsequent British support of de Gaulle. The U.S., by contrast, maintained diplomatic contact with the Vichy government until the landings.
transferred to V Corps headquarters. As the Allied forces moved east, direct point-to-point communication between AASC and the aerodromes became difficult or completely impossible. Consequently, the method for requesting such support became equally difficult or impossible. A provision was made for relaying requests for support through a wireless link used as a step-up that increased the range of the signal. Barring this, the request had to be transmitted to First Army headquarters, and other communication problems often made this impossible, through to AHQ Algiers where it would be considered and if approved, orders for the mission would be sent to the local airfields. This convoluted arrangement was time consuming and would not work very often, and in such "circumstances air support must be to a set plan and cannot be laid on at very short notice." As in the desert, the tentacles were often used for reporting the position of friendly troops during the initial advance, and not for making calls for support. Adding to the air support problems was the strength of the Axis air forces, which had been rapidly reinforced. The Axis air forces had 420 aircraft of all types in Tunisia with significant reinforcements available at nearby Sicily and Sardinia. Against this were some 639 Allied aircraft in Tunisia, supplemented by a further 230 aircraft at Malta. The Axis air forces

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36 Ibid.
38 NARA RG 331 Box 196 Reel 51-F AFHQ Comparative Air Force Strength Mediterranean Area, 26 January 1943.
were able to deploy this strength quickly because of their all-weather airfields, whereas the Allies found it difficult to locate suitable airfields. Moreover, whereas in North Africa Axis air force serviceability was often less than 50%, in Tunisia the German fighter force had serviceability often approaching 70% during the initial stages. Although the Allied air forces possessed more aircraft, they were unable to make use of them because of poor airfields, lack of spare parts, and poor C^3I that limited the scope of air support.

The practicality of providing air support for the landings figured prominently in the choice of objectives. Indeed, it was acknowledged that the potential weakness of the operation "was the lack of air bases to provide air cover and support for this vast enterprise in its initial stages." The lack of aircraft carriers forced ground-based aircraft to provide most of the initial air support for the landings. However, during the assault phases at Algiers, carrier-born aircraft from HMS Argus and HMS Avenger, with aircraft from HMS Formidable and HMS Victorious available if required, furnished air support. Aircraft from the Air Group of U.S. Naval Task Force 34 covered the Casablanca landings. The total carrier-borne fighter strength was roughly 166 aircraft in actual support of the

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39 Ibid.
40 RAFM, Papers of Air Marshal Robb AC 71/9/3, Principles of War and Strategy by Air Vice-Marshall W. Brook.
41 AHB, Air Support, op. cit., p.82.
42 Ibid., p.83.
landings. This was against an estimated operational force of 500 French aircraft.\(^43\)

The Allied air forces themselves were organized into two portions corresponding to the geographical organization of the task forces, and to the expected consolidation of the landing forces into the British First and American Fifth Armies.\(^44\) The Eastern Air Command (EAC), under the command of Welsh, was to support the advance of the British First Army. The American counterpart, known as the Western Air Command, consisted of the USAAF Twelfth Air Force under the command of General James H. Doolittle. The EAC was to assist First British Army in its race to Tunis, while the Western Air Command was to support the Western Task Force, and then prepare for possible action against Spanish Morocco or Spain.\(^45\)

In September 1942, Welsh issued an appreciation of the air plan for operation 'Torch'. This paper reflected how little the doctrine for the application of air power of all types (but tactical air power in particular) that had evolved in the desert had filtered through to the rest of the RAF. Tedder had convinced the CAS Portal that "only a centralised and flexible organisation can achieve...the air situation in which naval and land forces can operate successfully."\(^46\) Portal was convinced by Tedder's

\(^{44}\) This did not take place as scheduled, and the U.S. forces fighting in Tunisia were most often under the operational control of II U.S. Corps.
\(^{45}\) Howe, p.37.
\(^{46}\) Hall, op. cit., chapter 8 p.6.
deductions, and urged the Defence Committee to adopt the Middle East system. With Slessor's help, Portal began planning for future operations in Europe using "a mixed force of fighters, light bombers, army support and reconnaissance squadrons...all under the command of a single AOC-in-C." However, repeated failures of the British forces in the Middle East as late as two months before the planning for 'Torch' began did not convince everyone that the Middle East system was the best choice. The most notable opponent was the CIGS, General Alan Brooke, who thought the RAF was engaged in fighting its own separate war and that "Air Staff policy conspired against meeting the Army's legitimate needs." Thus, although the Air Staff was convinced the Middle East system of army support worked, opposition from Alan Brooke and others prevented its adoption as a doctrine. It was not until 14 November 1942 that the old system, favoured by Alan Brooke, of having an army 'component' supported by an RAF 'contingent' was abandoned in favour of Coningham and Tedder's system of a unified air force under the command of an Air officer working in conjunction with the ground forces. Consequently, the forces engaged in 'Torch' suffered from a lack of a workable air support system, and both its ground and air commanders had little idea of the proper use of tactical air power.

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48 Hall, op. cit., chapter 8, p.8.
49 PRO PREM 3/B Organisation of Air Support for the Army in Continental Operations, 14 November 1942.
The role of the air forces during 'Torch' was to provide air cover during the landings, to protect the lines of communication against air attack, to disseminate propaganda by leaflet dropping, to provide air cooperation and support for land operations subsequent to the assault phase, and to provide an offensive air striking force for strategic bombing.\textsuperscript{50} However, although close support was given lip service as being an important role for air power, only thirty-six Army Co-operation aircraft were allotted to First Army in the Algiers area; thirteen additional aircraft were allotted to the Oran area, and thirteen more to Casablanca.\textsuperscript{51} Indeed, it was felt that "Army support requirements [would] be limited to local tactical reconnaissance."\textsuperscript{52} This was reminiscent of the interwar ideas of air support, which held that the chief use of aircraft was in reconnaissance.

Originally, the plan for 'Torch' had called for an overall air commander, but Eisenhower had accepted American General Spaatz's advice that such an arrangement was impracticable. Rather than organizing the available air forces under a unified commander who had access to all the available intelligence and could thus focus his air strength against the most appropriate target, the RAF and USAAF were essentially fighting separate wars. For example, an instance occurred in early 1943 where American ground commanders refused to allow their

\textsuperscript{50} PRO AIR 47/13 Operation "Torch" (Plan "B") Air Appreciation by Air Marshal Sir William L. Welsh, 5 September 1942, p.5.
\textsuperscript{51} Ibid.
\textsuperscript{52} Ibid.
aircraft to respond to calls for close air support from the French XIX Corps, which had come under heavy Axis attack, because of a lack of interest in committing what was considered their own personal resources.53 After learning of this, Spaatz tried to resolve the problem by getting XII ASC and II Corps headquarters located adjacent to each other, so that XII ASC’s commander, Col. Howard Craig, could stop Fredendall from “making damned fool decision” about the use of air power.54 The need for unity of command forced Eisenhower, in January 1943, to appoint Spaatz as overall commander of the Allied air forces. To mitigate Spaatz’s lack of combat experience, and to placate British sentiments, the more experienced Air Vice Marshal James Robb was appointed as his chief of staff.55 Although this was an improvement, it did little in the face of ground commanders’ insistence on using the available fighter force in wasteful ‘umbrella patrols’ over the front lines, something that had been forbidden in the Western Desert by Winston Churchill in 1941.56

The poor initial organization of air forces was felt when units from the XII Bomber Command USAAF were allocated to respond to direct calls for support.57 Such calls had to go through the chain of command to Headquarters Eastern Task Force, then to Welsh who commanded the

54 LC, Papers of Carl Spaatz, I: Box 10, Memorandum by Spaatz on 17 January 1943.
55 Orange, op. cit., p.130. Robb was an old friend of Coningham.
56 JRUML Papers of Field-Marshall Sir Claude Auchinleck, Item 304 Note by the Prime Minister to the Chief of Staff Committee, 29 August, 1941.
57 PRO AIR 41/33 The North African Campaign November 1942 - May 1943. In December 1942, conflicting tasks allotted to Twelfth Air Force caused the formation of composite commands such as XII Bomber Command and XII Air Support Command.
EAC. If approved, the Twelfth Air Force was contacted, and orders were issued to XII Bomber Command.\textsuperscript{58} Such a cumbersome procedure was made worse by poor communication systems, and increased the time required before the order to launch a mission was issued to squadrons. Since this was the first coalition operation, the problems associated with placing forces from one nation under the command of officers from another appeared, and made the C\textsuperscript{3}I system even more complex. Anderson, although technically required to follow orders issued by General Eisenhower, was in a position where in "the unlikely event of your receiving an order which, in your view, will give rise to a grave and exceptional situation, you have the right to appeal to the War Office."\textsuperscript{59} This provision was only to be exercised when doing so did not endanger any part of the Allied force, or cause an opportunity to be lost. There is no evidence that this provision was ever used, but even allowing it showed the difficulty of conducting coalition operations. Further difficulties were experienced when attempting to employ American air units in a close support role. On 4 January 1943, USAAF units operating from Youks were placed at Lawson's disposal for a bombing mission. The initial mission was not accomplished due to problems of coordinating fighter escort for the bombers, and when asked to repeat the mission later in the day, the response was that they first had to get permission

\textsuperscript{58} Howe, p.294.
\textsuperscript{59} Ibid., p.36.
from the U.S. Air Headquarters.\textsuperscript{60} Both of these cases show how much the Allied commanders had to learn about designing efficient C\textsuperscript{3}I systems, how difficult this was in the context of a coalition force, and how little the lessons learned in the Western Desert were heeded. Indeed, during a talk to senior British and American officers, Coningham said that he did not understand "why some of the Army and Air officers concerned in the planning of "Torch" did not visit the Western Desert and learn at least some of the simple lessons which Eighth Army mastered over 12 months."\textsuperscript{61} The failure to do so added to the already considerable problems associated with fighting in the Tunisian theatre.

In particular, the lack of usable airfields around the landing areas, and even fewer fields closer to the front, did not allow the Allied air forces to deploy their strength fully. Most of the airfields captured by the Allies were rendered almost useless by heavy rainfall, and were quickly congested with aircraft. As early as 30 November, this congestion had reached "dangerous limits" and no further American squadrons were to be brought forward until suitable airfields had been secured.\textsuperscript{62} Axis air forces, by contrast, operated from all-weather airfields, allowing them to deploy rapidly over the front, harrying the advance of First Army.\textsuperscript{63} This,

\begin{footnotesize}
\textsuperscript{60} Ibid.
\textsuperscript{61} RAFM Papers of Air Marshal Robb, AC 71/9/109, Talk by AVM Sir A. Coningham to British and American Senior Officers, 16 February 1943.
\textsuperscript{63} PRO AIR 24/469 Eastern Air Command Operational Summaries, December 1942.
\end{footnotesize}
together with a lack of understanding amongst the Allied ground forces of the proper organization and use of tactical air power, combined to render Allied air strength largely irrelevant.

It was hoped that by the beginning of the second phase of the operation (5-20 days after the initial landings) that "G.O.C. First Army and A.O.C. RAF will have established their H.Q. in close proximity at Algiers."\(^{64}\) This was important because plans for the provision of pre-arranged air support were to be made through direct liaison between the commanders of EAC and First Army. However, this important element in the application of close air support was forgotten during operations, as the headquarters of both formations were rarely located near each other and moved constantly, making communication problems worse.\(^{65}\) Both the communication systems within each part of the Allied force and the intercommunication between various units were completely unsuited to the requirements of operations in the theatre. This was a major concern of Air Commodore Lawson, who had been responsible for the operation of forward squadrons supporting First Army's advance since he joined the Army Support Group Command Post (formed so that the Officer Commanding EAC would have some means of controlling air operations).

On 20 November, Lawson complained to EAC that communications were in a chaotic condition. Advanced AFHQs Command Signal Section [was] working but [could] not get communication with any of the forward aerodromes or AHQ. The Signal personnel here [were]

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\(^{64}\) PRO AIR 41/33 The North African Campaign November 1942-May 1943, p.76.

convinced it [was] due to the fact that the receiver stations [were] not told of the existence of Command Post or of the frequencies on which they [were] working.®®

Lawson went on to say that he was "astonished at...the lack of knowledge of the operational setup and of the urgency for drive in getting proper communications established."®® The situation became so acute that the Army Support Group Command Post could not keep up with the constant movements of EAC HQ, and the only reliable means to communicate with the forward airfields was through the close support controls.®® This situation was mitigated somewhat with upgraded and reinforced signal communications within the EAC, between it and First Army, and with the formation of 242 Group RAF. This new formation was to assume responsibility for duties formerly carried out by the Command Post, and was to take over the planning for and operational control of 322 and 324 Fighter Wings and 326 Light Bomber Wing."®® These Wings would continue to be administered through EAC HQ. Although an improvement, First Army remained dissatisfied with the scale and impact of close air support.®®

Relations between EAC and First Army deteriorated because of the inability of the EAC to continue flying constant patrols over the front to break up attacking Axis dive-bombers - an extremely wasteful and

®® PRO AIR 41/33 The North African Campaign November 1942-May 1943, p.76.
®® Ibid.
®® Ibid.
®® PRO AIR 25/1040 Operational Record Book of 242 Group RAF, Organizational Memorandum No.1, 6 December 1942.
questionable use of air power. As had been the case during the
interwar period and early in the desert fighting, close air support became
impossible in a climate of mutual hostility. The disagreement sparked a
series of signals between Anderson and Welsh. On 9 December,
Anderson objected to a diversion of air effort from umbrella patrols to an
attack on the Sfax-Sousse-Tunis railway, and wrote that he had just
heard all aircraft at Youks tomorrow being employed special tasks. Thus completely removing them from task of supporting Fifth Corps. As this special task presumably connected with operation First Army would much appreciate being at least informed of nature of task if not consulted beforehand. Co-operation not easy when kept in the dark.\(^71\)

Welsh responded the following day that he was unable to reach Anderson
on the phone to inform him of the special operation, illuminating the
communication difficulties experienced at all levels within both services.
Worse still was that if required, the aircraft were available to V Corps, but
five hours were needed before the aircraft could begin to respond.
Anderson understandably called this notion "farcical."\(^72\)

The situation worsened in December. The negative tone of a signal
confirming a series of sorties requested in the V Corps area is obvious
when it was asked "that this programme not be interrupted as happened
today without previous arrangements with V Corps and 242 Group."\(^73\) To solve the problem, it was decided that AFHQ would coordinate any future

\(^{71}\) Ibid., p.79.
\(^{72}\) Ibid.
\(^{73}\) Ibid., p.80.
bomber effort, and that any bombing requests by First Army would be passed to AFHQ and not to EAC. However, as no direct communication was possible between AFHQ and First Army, requests had to be passed to AFHQ through EAC signal channels. 

Delays due to poor organization and improper use of air power were made worse by the inexperience of both RAF and USAAF pilots in flying close air support missions. Even those experienced pilots transferred to Tunisia from the Western Desert had to adapt to an environment very different from that of the desert. Regions of Tunisia, especially those where Allied forces were operating, were mountainous and covered with trees, providing ample camouflage from aircraft. This was in stark contrast to the conditions encountered in the desert. USAAF pilots were completely untrained for close air support operations, and had to overcome the steep learning curve that had faced the RAF early in the fighting in North Africa. Only combat experience provided solutions for these operational difficulties, but the learning curve associated with how to organize air power and how to exploit intelligence to apply that power could have been more easily overcome by adapting the template that already existed. Because few of the lessons learned in the Western Desert had filtered through to the rest of the RAF or USAAF, those units participating in 'Torch' had many obstacles to overcome.

74 Ibid.
One such obstacle was the unsuitability of the Bisley light bomber to daylight operations of any kind. This aircraft was simply too slow and too poorly armed to deal with enemy fighters. Poor Allied C²I and an inability to deploy its strength, which often did not allow for coordination of bomber missions with adequate fighter escort, made this worse. On 4 December, nearly an entire squadron of Bisley bombers was lost in a single mission. Many of the other difficulties related to poor Allied C²I, and thus a close examination of the C²I systems of the forces engaged is essential to an understanding of how and why close air support was ineffective in aiding the ground offensive.

The same sources of intelligence that had directed close air support and interdiction operations in the Western Desert proved essential to operations in Tunisia, when technical and organizational problems had been addressed. As in the desert, strategic intelligence sources could focus operational intelligence gathering efforts, but due to poor organization and lack of experience amongst intelligence staffs, the usefulness of intelligence was downgraded, much as it had been in the early stages of the desert campaign. Again, some of the difficulties were unavoidable until intelligence personnel had achieved sufficient practical experience in the theatre. However, the organization and integration of

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75 Orange, p.257. The Bisley was essentially a Blenheim V light bomber that had seen service in the Western Desert, but had been largely phased out in early to mid 1942 because of its vulnerability to German and Italian fighters, its slow speed, and its light bomb load.

76 AIR 27/244 Operations Record Book of No.18 Squadron RAF, 4 December 1942.
intelligence into overall planning and operations should have been far better because a workable template existed close at hand.

The GC&CS at Bletchley Park continued its work against German and Italian high-grade codes and ciphers, and continued to transmit this information to its recipients through Special Liaison Units (SLU) and Special Communication Units (SCU) links. When designing the intelligence apparatus, which would accompany the Anglo-American forces to Tunisia, an officer from GC&CS was appointed Chief Air Intelligence Officer (CAIO) and was given authority over the intelligence staffs from EAC and the USAAF 12th Air Force. He was also charged with integrating the available low-grade signals intelligence ('Y') into the intelligence appreciations sent to commanders. There was, however, no provision for anyone skilled in the use of Army signals intelligence on the staff at AFHQ, and the ground forces were not represented in the joint intelligence reporting centre at AFHQ. Because of this, the procedure for getting Ultra intelligence to Anderson was very convoluted.

The procedure began with the breaking of the key for the Enigma cipher at Bletchley Park. From there, the messages were decrypted and analysed by intelligence officers, sometimes several hours after interception, and the information was re-enciphered and transmitted to AFHQ, initially at Gibraltar. The intelligence was deciphered at Gibraltar, and important pieces were re-enciphered and transmitted through a

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Hinsley, op. cit., II, p.739.
SCU/SLU link to the headquarters of Western, Centre, and Eastern Task forces. Again, the text was deciphered, and only vital information was re-enciphered and sent to Anderson at HQ First Army. However, Anderson's headquarters moved so frequently, and the communication links were often so unreliable, that the intelligence was further delayed.\textsuperscript{78}

This completely unsatisfactory arrangement lasted until February 1943, when a total reorganization of ground and air forces, and intelligence systems, was undertaken.

Ultra proved to be of little operational value, and that value which did exist was impaired by the convoluted way in which the intelligence was disseminated until well into 1943. It remained, however, the best source for strategic intelligence on enemy movements, strength, capabilities, and the extent to which Allied operations were making an impact on the Axis forces. The only reason why this was so was the long lifespan of strategic intelligence. On 9 November, for example, Ultra showed the build-up of German air strength in Tunisia by revealing that Fliegerkorps II had established an advanced headquarters in Tunis, and reinforcements of the latest and best German aircraft (Focke Wulf 190s) had taken up station on the nearby El Aouina airfield.\textsuperscript{79} Ultra also traced the increase in German ground forces around Tunis. On 10 November, Ultra reported

\textsuperscript{78} Ibid., pp.739-740.

\textsuperscript{79} PRO DEFE 3/783 QT 5720, 9 November 1942.
that Kampfgruppe 'T' was being formed in Tunis, and also provided
details of the reinforcements and supplies being sent to Tunisia.80

Inexperienced intelligence staffs degraded the operational value of
'Y' during the initial campaign. They were still new to the work and new
to each other, "the result of a lack of practical experience of the
interception of German Air Force traffic, or any other intercept work."81
Indeed, their sole experience came from "a hurried course in the UK."82
There was an attempt to train 'Y' units for the operation. British 'Y' units
in the United Kingdom were to train the American Signals section and the
American Colonel who was to command all the American field units in
North Africa. However, this had not been accomplished by the time the
landings took place.83 Even had this been done, it is unlikely that there
would have been a noticeable improvement in the performance of
American 'Y' units, since the organization and integration of 'Y'
intelligence left much to be desired until March 1943. The integration of
experienced British personnel into American 'Y' units did, however, aid
their performance.84

To provide 'Y' service for the landings, the main RAF 'Y' station at
Cheadle in the United Kingdom sent intercepted traffic, solutions to low-

80 Ibid., QT 5896, 10 November 1942.
81 NARA RG 331 Mediterranean Allied Air Force Directorate of Operations and Intelligence, E258
Box 13, Anglo-American "Y" Liaison, undated.
82 NARA RG 331 Mediterranean Allied Air Force Directorate of Operations and Intelligence, Box 74
Reel 33-C Notes and Maxims on the "Y" Service in the Mediterranean Intelligence Aspects.
83 PRO WO 204/938 AFHQ G-2 Section Report of 17 March 1943 entitled Intelligence Lessons
from North Africa, p.10.
grade codes, and traffic analysis to the headquarters ships of Eastern Task Force. Numerous problems plagued both these units, and indeed the entire Allied 'Y' organisation. The CAIO, his army equivalent at AFHQ, and their staffs were too inexperienced and poorly equipped to deal with incoming 'Y' intelligence. Not that there was much of it, owing to a lack of radio sets, poor organization, and inexperienced personnel.

After the initial landings, two new 'Y' units were allocated to provide RAF 'Y'. Number 380 Wireless Unit (which arrived in Algiers on 12 November) remained behind the advance to perform W/T duties, and 381 Wireless Unit (which landed at Bone on 7 December) was responsible for R/T interception with the advancing units. However, 380 WU, for example, was not operational until 20 November, and was unable to receive signals from Cheadle until 27 November. It too had serious equipment and staff problems, and experienced interception difficulties because of the terrain encountered in Tunisia, very different terrain from that of the Western Desert. Consequently, there was often little or no warning of the enemy air attacks that so delayed the initial advance by First Army.

Both American and British army 'Y' units experienced similar difficulties. First Army's 'Y' unit, for example, was split in half and transported in two separate convoys. The resulting confusion kept this

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85 Hinsley, op. cit., II, p.741.
86 NARA RG 331 Entry 258 Box 6, Mediterranean Allied Air Force Director of Operations and Intelligence, Signals Intelligence Sub-section, Mediterranean Air 'Y', p.4; PRO AIR 40/2252 Mediterranean Air 'Y', 18 September 1943, p.4; Clayton, op. cit., p.228.
unit inoperative until late December.\textsuperscript{87} When it did become operational, it suffered from the lack of experience, poor equipment, and the difficult terrain that affected interception ability, similar problems to those which had plagued air 'Y' staffs.

In addition, the lessons learned by 'Y' units in the Western Desert had not been heeded in the planning for 'Torch'. Eighth Army 'Y' units created a Special Wireless Group which monitored the enemy's entire communication network throughout the theatre, so that the Combined Bureau Middle East could identify the various codes and ciphers in use and attack those which the Field Units could not exploit. During the final phases of operation 'Torch', First Army's 'Y' unit tried to do this at the expense of exploiting tactical traffic.\textsuperscript{88} Moreover, there was no attempt to intercept German Army Enigma traffic transmitted on Medium Frequencies, which could only be exploited in the forward areas.\textsuperscript{89} Subsequently, much valuable traffic was simply unavailable to AFHQ or First Army. Much of the reason for the failure of both air and ground 'Y' was that the Allies were unprepared for the scale of operations in the Tunisian theatre, and did not pay proper attention to the hard lessons learned by the RAF and Eighth Army in the desert.

This was also very apparent in the provisions for prisoner of war interrogation, which were inadequate, given that American forces

\textsuperscript{87} Hinsley, II, op. cit., p.744.
\textsuperscript{88} Ibid.
\textsuperscript{89} Ibid.
estimated that roughly 50% of all intelligence came from this source.©© Detailed interrogations of prisoners still took place in the United Kingdom, where the information was collated with other intelligence before being disseminated to field commanders, but there was no coordinated Allied effort to extract operational or tactical intelligence until February 1943. Both the American interrogation team and its British counterpart operated as separate entities, with little intercommunication between them. Consequently, this source was not adequately exploited until February 1943.

The fighting in the Western Desert had shown that the exploitation of captured enemy documents went hand in hand with the interrogation of prisoners of war. From providing background on enemy units to be used in the interrogation process, to simply providing useful intelligence, they were an important source for both strategic and operational intelligence. However, despite the importance of this source, the provisions for making use of it were wholly inadequate, and it was not until May of 1943 that it was recognized that "valuable enemy documents [were] frequently found on all kinds of captured equipment, particularly in vehicles."©© Prior to the landings themselves, units were to "supply themselves before leaving the United Kingdom if practicable with large envelopes and bags" appropriate to sending captured documents to

©© RG 331 Box 55 Allied Force Headquarters APO 512, 25 May 1943.
the Assistant Chief of Staff Intelligence of the task force. There was no attempt to exploit fully this source by creating a staff to gather documents from all three task forces. After the landings, when AFHQ had located itself at Algiers, a G-2 (intelligence) Captured Documents section was set up to do just that. However, until sufficient expertise and adequate communications had been assured, this source could not be properly exploited.

The RAF in the Western Desert had found that photographic reconnaissance was extremely important in, amongst other things, locating targets for close air support and interdiction strikes, and assessing damage inflicted. In contrast, the lead elements of the advancing Allied forces had only one photographic reconnaissance unit equipped with six Spitfires, for photographic reconnaissance. There was no provision to increase this allocation until the end of February 1943, by which time the Allied air forces in Tunisia had learned what the Western Desert Air Force already knew - that reconnaissance was vital to all applications of tactical air power.

As with the rest of the Anglo-American forces, the American and British photographic units seemed to be engaged in separate wars during the initial stages of the Tunisian campaign, and neither the British 4th Photographic Unit nor the USAAF 3rd Photographic Reconnaissance Group

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82 Ibid.
83 Ibid.
made any contribution until the end of February or early March.

Number 4 PRU, supplemented by a few Bisley light bombers, provided all the photographic reconnaissance for First Army from Maison Blanche airfield near Algiers. The unit was plagued by a lack of water for developing its photographs, and was crippled by a loss of equipment after a raid on Maison Blanche on 20 November. During this attack, three Spitfires were destroyed and two others damaged out of the original six that arrived. The USAAF's 3rd Photographic Reconnaissance Group was to relieve 4 PRU at Maison Blanche in December 1942 or January 1943, but the Group was not operational until February. Moreover, the distance between Maison Blanche and the front, combined with inexperienced and too few photographic interpreters, delayed and rendered useless much of the intelligence gathered by both photographic reconnaissance units.

The reason for the lack of success in photographic reconnaissance was because of an incomplete anticipation of the role and development of this source by the planners of 'Torch'. On 26 October 1942, the Joint Planning Staff and Intelligence Section had worked out a guide for the "coordinated demands for Air Photography in the Mediterranean", which were soon outgrown by the operational requirements of the Tunisian campaign. However, by the end of December, changes had been

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95 PRO AIR 23/6571 EAC Intelligence Summaries, No.4 PRU, 8/11/42 – 31/12/42.
96 NARA RG 331 Entry 270 Box 2 Photographic Reconnaissance, Chapter 1 The Algiers Period. The USAAF's 3rd Photo Group had no qualified photographic interpreters as late as the middle of December 1942.
97 Ibid.
undertaken which, when combined with further organizational changes to the Allied ground and air forces, greatly improved the speed and reliability of photographic reconnaissance.

All the scattered elements of the photographic reconnaissance system were gathered together, making it easier to coordinate their efforts. Two RAF interpreters were left with 4 PRU for first phase interpretation, while the remaining five were assembled together with the British Army interpreters to form the North African Central Interpretation Unit (NACIU) at EAC headquarters at Maison Carree. All the air photographic resources were put under the command of Lt. Col. Elliot Roosevelt who was responsible for the execution of missions and their proper exploitation. Moreover, to ensure proper guidance of photographic reconnaissance activities, a PRU Committee was set up comprising a member of the Air Staff of AFHQ, the Chief of G-2 (Intelligence) AFHQ, the Assistant Chief of Staff A2 of XII Air Force, the Chief Intelligence Officer of EAC, and the Commanding Officer of the NACIU. The effect of this first important step towards integration and coordination of photographic reconnaissance efforts was not realized until communication systems were improved, and a more rational command structure existed to take action based on this improving intelligence source. The same was true of tactical reconnaissance.

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98 Ibid.
99 Ibid.
Tactical reconnaissance for First Army was provided by 225 Squadron RAF and 154 Squadron USAAF. Number 225 Squadron was technically under the operational control of 242 Wing; however, as discovered in the desert, the real control lay in the hands of army commanders at the expense of overall efficiency. 154 Squadron USAAF was under the operational control of the USAAF's XII Air Support Command. Again, however, the missions were supposed to be designated by 242 Group, but the reality was that ground force commanders issued orders for reconnaissance directly to the squadron.\footnote{100}{AIR 23/7434 Report on Air Operations by 242 Group RAF in Support of 1st Army, January 1943.}

In addition, as the communication networks were so inadequate during the initial stages, much of this intelligence never reached those who needed it. Moreover, the overwhelming presence of the Axis air forces, in the face of unfocused and mostly uninformed Allied air power, made fighter escort essential to successful tactical reconnaissance flights, sometimes requiring as much as two full squadrons per mission.\footnote{101}{PRO AIR 27/1395 Operations Record Book 225 Squadron, December 24 1942.}

The tactical reconnaissance squadrons were eventually required to supplement the photographic reconnaissance unit's efforts by providing oblique and vertical photographs. Five of the seventeen aircraft of 225 Squadron were capable of taking pictures, as were a further two aircraft of 154 Squadron.\footnote{102}{Ibid.} Tactical reconnaissance pilots learned, as they had in
the desert, that flying above 3000 feet avoided much anti-aircraft fire, and gave pilots a better impression of the area than flying lower.\textsuperscript{103}

The Allied intelligence services all suffered from an understandable lack of experience, and a less forgivable lack of integration and organization, which combined to render them largely useless to the main goal of advancing on and capturing Tunis and Bizerta. The British First Army managed to advance to within fifteen miles of Tunis within twenty days of the landings, but this was due as much to the Axis decision to withdraw eastward and establish bridgeheads around these two port cities than the success of the Allied battle plan. Once they met determined resistance, deficiencies in communication, intelligence, command structures, and the organization and ability to deploy their forces became quite evident. In such a context, close air support, which had proven so successful in the desert, was of little use.

The limitation of having much of the air strength initially located at Gibraltar was unavoidable, but the organizational difficulties could have been overcome by drawing upon the template developed in the desert. By doing so, it would have been possible to use the scarce air resources to their fullest during the initial stages of the advance to Tunis. Instead, the air effort was diffuse, uncoordinated, and largely ineffective. Consequently, Allied ground forces were subjected to heavy enemy air attack that delayed their advance, and the Allied air forces were unable to

\textsuperscript{103} Ibid.
offer close support with any effect because the air resources were being used poorly.

Where the WDAF was able to direct its air resources against Axis supply when not required for close support, the Allied Air Forces in Tunisia were unable to affect this vital flow. Indeed, early air and naval action against reinforcements being sent to Tunisia (reinforcements which eventually halted First Army’s advance only fifteen miles from Tunis) may have paid huge dividends. Instead, the German Naval Operations Staff found supplying Tunis to be an easy task, and Goering boasted that Tunis was only "a panther’s leap" across the water from Sicily.¹⁰⁴ Between December 1942 to February 1943, the Axis forces were able to transport roughly "150,000 men with their armor and equipment, and supported and then maintained them almost wholly from airdromes and seaports within the range of [Allied] air forces."¹⁰⁵

The difficulties experienced both with the C²I systems of the Allied forces, and the practical problems associated with maintaining and deploying large numbers of aircraft, appeared at all levels. Even medical provisions were inadequate. When 614 Squadron was moved, on 5 December, from Blida to Canrobert, several men became ill and required hospitalisation which was "not available due to lack of organisation."¹⁰⁶ Maintenance arrangements were so inadequate that serviceability

¹⁰⁴ Bennett, op. cit., p.190.
¹⁰⁶ PRO AIR 27/2120 Operations Record Book 614 Squadron RAF 5 December 1942.
continually dropped. By January 1943, many squadrons were in the same position as 13 Squadron, whose average number of serviceable aircraft was never more than six.\textsuperscript{107} This was due to forcing standing patrols over the front lines, with their consequent wear on pilots and planes, as well as an increased expenditure of fuel and spare parts. In addition, the souring relationship between army and air commanders, because of this use of air power, exacerbated the numerous problems with Allied C\textsuperscript{3}.1

Despite these problems, the baptism of fire First Army received gave it valuable experience that increased its fighting value, and showed the organizational and material weaknesses of their forces. Reorganization at all levels was essential not only to the effective application of close air support, but to the efficient use of all Allied forces. The Axis forces noted a steady increase in the fighting value of both British and American forces with a particular increase in the degree of air/ground cooperation, "which was not good at the beginning of the campaign [but] had improved noticeably by the end."\textsuperscript{108}

A valuable first step towards the reorganization of close air support aircraft had been taken on 22 January 1943. Concern over the state of Allied close air support prompted General Spaatz to send a message to Air Marshal Tedder in which the situation was described as 'critical'.\textsuperscript{109}

\textsuperscript{107} PRO AIR 27/181 Operations Record Book, 13 Squadron RAF January 1943.
\textsuperscript{108} PRO CAB 146/27 Evaluation of the British and American Commands and Troops in North Africa, Appreciation by Freemde Heere West, 18 May 1943.
\textsuperscript{109} PRO AIR 41/33 The North African Campaign November 1942-May 1943, p.121.
response, Spaatz established the Allied Air Support Command under the command of American General Kuter. This arrangement, which was part of the general reorganization agreed upon by Allied leaders at the Casablanca conference earlier in January, saw General Kuter coordinating requests for air support between Twelfth Air Force and EAC. This organization resulted in "more substantial help [from the air forces] than in the earlier days of the operations."

XII ASC received its baptism of fire through operations designed to deny the enemy the use of the air, to afford reconnaissance for the ground troops, and to offer some close air support for the ground forces "by bombing and strafing attacks against enemy ground targets." Most of the operations were reconnaissance, but strafing and bombing missions were carried out when suitable targets were found, a task made more difficult by poor C³I. Indeed, of the 1,801 sorties flown from 21 January to 14 February, only 425 were in close support, while 1,052 were either escort for reconnaissance and bombing missions or fighter patrols. The losses were roughly equal to the number of enemy aircraft destroyed, and it was claimed that 77 trucks, 4 tanks, and an additional 20 vehicles were

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112 NARA RG 331 Entry 251 Box 1, Mediterranean Allied Air Force, Director of Operations and Intelligence, Air Staff Registry, Report on Operations Conducted by XII Air Support Command USAAF Tunisia 13 January 1943-9 April 1943, p.2.
113 Ibid.
114 Ibid., p.3.
destroyed, with a further 173 trucks, 5 tanks, and 71 other vehicles damaged. This was a respectable record for green units.

Thus, many of the important factors in successful close air support operations were slowly beginning to develop in Tunisia. Intelligence personnel had gained experience that made them technically more competent than they had been initially, and ground and air forces were receiving combat experience that had improved their value. These improvements, although as yet unfocused, had only come through a difficult and largely unnecessary trial by fire. The dispute between the CAS and CIGS over control of air forces resulted, much as in the interwar period, in the failure to adopt the coherent doctrine for close air support developed in the desert. The American forces can be more easily forgiven for ignoring the advice from Brereton, but the result was the same. In both cases, it was the failure of existing close air support systems in combat that forced the change. However, until the reorganisation of intelligence systems and Allied ground and air forces, their full potential, and the potential of close air support that depended so heavily upon effective intelligence, was not realised.

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118 Ibid., p.4.
Chapter 7: Close Air Support after the Reorganization of February 1943

The inability of ground and air commanders to effectively deploy and control their forces led to a general reorganization of armed forces and intelligence organizations in February 1943. Much of the experience gained during the fighting in the Western Desert was drawn upon, including the transfer to Tunisia of many officers and personnel from the Eighth Army and the Western Desert Air Force. The result was a vastly more streamlined and rational command structure with better communications between the various command levels and services, allowing the already improving intelligence system to be more easily integrated into operations. Alongside these changes to the C²I system, increasing emphasis was placed on airfield construction, repair and salvage, and general supply. This combined with the increased quality of the Allied forces, which had gained valuable combat experience. The result was a vastly improved ability of the Allied air forces to provide and exploit the effect of close air support. The changes to the C²I systems will be examined, followed by the effect of these changes on the course of the land battle.

On 19 February, as a result of decisions made at the Casablanca Conference, the Mediterranean Air Command (MAC) was formed under the command of Air Chief Marshal Tedder. The purpose of MAC was to unify all Allied air efforts in the entire Mediterranean area, either on land or over water. To give representation to both British and American
officers at MAC, Air Vice Marshal Wigglesworth was named Deputy Commander, with USAAF Brigadier General Howard A. Craig as his Chief of Staff. This arrangement saw the two most senior positions going to experienced officers from the WDAF. However, this made practical sense given their greater experience, and the situation made it necessary.

Beneath MAC headquarters was the new Northwest African Air Force (NWAAF) formed to "unify the diverse activities of the various elements comprising within the combat area Western Desert Air Force of the Middle East, the British Eastern Air Command, and the United States Twelfth Air Force." The commander of the NWAAF was General Carl Spaatz, with Coningham's old friend Air Vice Marshal Robb appointed as his deputy. The NWAAF was composed of three separate combat elements. The first of these was the Northwest African Strategic Air Force (NWASAF) under the command of General Doolittle, who commanded all medium and heavy bombers with the primary mission of destroying enemy naval and air bases, as well as communications and convoys. The second element was the Northwest African Tactical Air Force (NWATAF), commanded by Coningham, who brought with him his unequalled experience in tactical air operations. His command consisted of fighter, fighter/bomber, light bomber, and reconnaissance squadrons from 242 Group RAF, USAAF XII ASC, and the Western Desert Air Force. His mission was the close support of ground forces. The third combat element...
element was the Northwest African Coastal Air Force (NWACAF) under the command of Air Vice Marshal Sir Hugh Lloyd. His command came from elements of the RAF's Eastern Air Command, and was charged with the defence of Allied ports and convoys and of carrying out anti-shipping and anti-submarine patrols.\(^3\) Again, the staffs of the three subordinate commands were made up as equally as possible from both the RAF and USAAF.\(^4\)

This more rational command structure was based on experience gained in the desert, and many key officers from the desert (such as Coningham and Cross) were brought in to ensure a smooth transition. Where previous air efforts were diffuse and largely ineffective, now there was at least a streamlined command structure that could, if adequate communications were provided, enable intelligence and orders to flow with a minimum of delay. The most important advantage of this reorganization was that it offered flexible use of aircraft against the best possible target revealed by intelligence. These were sweeping changes, but not every officer approved of them. In particular, Major General James Doolittle, commanding the USAAF XII Air Force, was "strongly opposed...to the consolidation of British and American areas, air units or systems and [felt] that they [were] more effectively employed when

\(^3\) Ibid.
completely segregated.® However, this display of pique did little to dampen the general enthusiasm for the changes.

Aside from convincing senior officers of the benefits of the new organization, other difficulties had to be overcome. The intelligence system also needed to be reorganized, and difficulties with supply of spare parts, pilot training and replacement, and airfield construction had to be addressed.® To do so, Training Command was formed in February 1943 to impart experience to new aircrew before they were assigned to combat formations. Experienced instructors not only fine-tuned the basic flying skills of the new pilots, but also taught them about the specific dangers associated with flying in the new theatre - many of which were different from those experienced in the desert. Troop Carrier Command ferried vital supplies to the forward airfields, towed glider borne troops and paratroopers, and evacuated wounded to rear hospitals. Similarly, the British and American maintenance organisations were combined to form the Air Service Command, which administered the “vast organization of service and supply, including all essential materials for the service and equipment of aircraft, and for the construction and maintenance of airfields.” The result of this was a vastly improved ability to maintain and operate aircraft over the battlefield.

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® LC Carl Spaatz Papers I: 12 Memorandum to the Air Commander-in-Chief, Allied Air Forces entitled Organizational Changes, 1 February 1943.
® Maintenance requirements and airfield construction were high on the priority list of the Allied forces, but even until March 1943, pilot and ground crew training needed to be given more attention. LC Papers of General Carl Spaatz I: 12 General Operational Directive from Air Marshal Coningham 2 March 1943, indicates the training standard for pilots and ground crews needed improvement in order to meet the operational standard.
Communications were provided between all elements of the NWAAF. In order to carry out continual operations against the enemy, of which close air support was a significant part, rapid and reliable communications had to be provided between headquarters, commands, and units. This was essential in order to allow intelligence to flow, to enable commanders to create a plan for operations, and to permit the plan to be executed. Coningham thought that the existing arrangement by which operations were restricted to “areas within ranges of aircraft from their home bases” was inefficient.\(^8\) He felt that the “main elements of the Force should be capable of providing mutual support and concentration as necessitated by operations.”\(^9\) He wanted to be able to move aircraft from one sector to another at short notice to achieve the desired concentration for operations against the best targets. This depended on knowing what the targets were, and being able to call aircraft to respond. In short, the importance of intelligence and communication to the application of close air support (a lesson learned at great cost in the Western Desert) was transferred to Tunisia.

For the most part, communications between NWAAF units were by landline with W/T backup. The predominance of landline communication was made possible by the relatively static battlefield (at least as compared to the Western Desert) encountered in Tunisia, and made for much more secure communications. The main difficulty facing the signals

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\(^8\) Orange, op. cit., p.140.
\(^9\) Ibid.
service was “equipping and manning a number of new formations from the resources available to the existing, and much smaller, organization”, since it was some time until new equipment could be provided. The signals section of EAC, for example, was to become the signals section of HQ NWAAF, which had many more subordinate commands with which to communicate, and “that this should also carry the communication requirements of HQ Mediterranean Air Command.”

At the time of the reorganization, HQ NWATAF had only two twin-channel low power mobile W.T. Stations. Of the subordinate formations under HQ NWATAF, only the Western Desert Air Force “was completely equipped and able to take over any new W.T. commitments required” by MAC. The USAAF’s XII Air Support Command could handle its own internal communications, but nothing further, and the other RAF units had chaotic communication systems that needed to be organized.

Further reorganization of signals personnel included the assignment of No.2 Signals Section to XII ASC to provide operational channels that were lacking. Signals personnel and equipment were transferred to 242 Group to be used on a Sector basis for the control of both 322 and 324 Wings, and the newly created Tactical Bomber Force found its communications component from 326 Wing. No further aid was forthcoming from the United Kingdom, aside from reinforcement.
personnel that were not sufficient in numbers or in training.\textsuperscript{15} Despite these difficulties, the more streamlined command structure allowed for vastly superior communications that, although far from ideal, were adequate to pass intelligence and control operations.

In early 1943, signals procedures were standardized by a series of governing rules agreed upon by both American and British forces. Ensuring that all forces operated by the same procedures enhanced the speed with which messages could be received and if necessary passed along. It also minimized the chance of misunderstanding the message or its intended recipient. The standardized procedures covered both landline and radio communication, and not only dictated the form messages would take, but procedures for transmitting them. For example, when using radio, if a call was not promptly answered, it was immediately repeated. If the second call was not answered, the calling station was to wait two minutes before trying again. To preserve security, and to make it as difficult as possible for enemy ‘Y’ units to reconstruct Allied order of battle and deployment, calls were rarely repeated more than three times.\textsuperscript{16}

The reorganization of the ground formations in Tunisia was broadly similar to that of the air forces. All ground forces were placed under the operational command of the newly formed 18\textsuperscript{th} Army Group, commanded by General Alexander. Broad directives were still issued by General Eisenhower at AFHQ, but Alexander, with much more combat experience

\textsuperscript{15} Ibid.
\textsuperscript{16} NARA RG 331 Entry 272 Box 29 Memorandum to NATAF from HQ NWAAF, Agreed Rules US/UK, 19 March 1943.
than Eisenhower, was responsible for designing the plan to carry them out. Under this new headquarters were the British First and Eighth Armies, the American II Corps, the French XIX Corps, and reserve forces.

Communications were augmented to allow for more contact between formations, but especially from 18th Army Group to its direct subordinates. Difficulties with signals security continued to be a problem faced by all ground formations, and to a lesser degree the air forces, because of their greater reliance on landlines. This problem, which had plagued British forces throughout the fighting in the Western Desert, was made worse because it had not been given sufficient attention during training. The result was that the Axis forces “obtained much information by listening to [Allied] wireless traffic.”

Signal communication was given a higher priority in ground unit training. In particular, signals staffs began “to realize very quickly that as soon as wireless became the main means of communication, an officer must at all times have the headphones on and be ready to give an immediate answer, and not have to be fetched.” Advice was accepted from signals personnel on the location of headquarters in order to obtain the best communications, and both American and British ground forces were trained to respect cable routes to minimize the damage done by vehicles. Wireless R/T communication was improved by the introduction

19 Ibid.
of the SCR 299 radio set which could maintain communication over a distance of 100 miles during mobile operations, although in mountainous areas this distance was considerably reduced. High-speed wireless links were established between Main and Rear army headquarters and with higher command. It also became standard practice, where possible, to lay cable from forward battalions back to divisional headquarters. The result was that when the German attacked, “the line communications were such that really effective defensive fire was brought to bear.” This procedure also eased the pressure on wireless crews.

Communications procedures for requesting close air support were standardized in late February and early March 1943, modelled on the procedure used by Eighth Army and the WDAF. The previous chaotic procedure by which messages were sent ‘in the clear’ at inappropriate times, or the incorrect code or cipher was used, had hindered the process or given valuable information to the enemy. To combat this, instructions were issued concerning the correct procedure for requesting support, as well as when and which codes and cipher to use for various messages. For example, the Syllabic cipher had a very low security value when compared with the Type X or book ciphers, and to avoid enemy exploitation it was no longer used for any traffic.

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20 Ibid.
21 Ibid.
22 Ibid.
23 NARA RG 331 Entry 253 MAAF Directorate of Operations and Intelligence, Operations Section, Army-Air Cooperation, Appendix “D”, 13 March 1943.
security, map references for targets in requests for support were sent in clear, while the bomb line was encoded using the map reference code.\textsuperscript{24}

As with the air forces, communications were strained by operations, but were sufficiently powerful to enable the transmission of intelligence up the chain of command and for orders to be issued to subordinate formations. Military communications were never perfect, and perfection was only an ideal. The communications system between ground forces, between air forces, and between the services, was adequate for the purpose.

The advantage to the improvements in the signals systems and command structures was increased contact between the various fighting units, with 18\textsuperscript{th} Army Group being responsible for "coordinating all Intelligence activities of 1\textsuperscript{st} and 8\textsuperscript{th} Armies."\textsuperscript{26} 18\textsuperscript{th} Army Group disseminated the daily intelligence reports from First and Eighth Armies, supplemented as necessary by any incoming intelligence felt to be relevant to other formations. Personnel from 18\textsuperscript{th} Army Group trained to deal with captured enemy material, were attached "to formations for the purpose of collecting, examining and passing back captured material during specific operations."\textsuperscript{26} 18\textsuperscript{th} Army Group's Intelligence section was also responsible for coordinating photographic reconnaissance efforts required by First and Eighth Armies, and for coordinating the collection

\textsuperscript{24} Ibid., Appendix "E".
\textsuperscript{25} NARA RG 331 Records of Allied Force Headquarters Box 72 Reel 6-C Allied Force Headquarters Office of Assistant Chief of Staff, G-2, Memorandum entitled Intelligence Procedure to B.G.S.I., 18 Army Group, 10 February 1943.
\textsuperscript{26} Ibid.
and exchange of 'Y' intelligence. This important element of 18th
Army Group's responsibilities ensured that intelligence was exploited as
fully as possible, and reduced the previous independence of American and
British forces.

The Eighth Army brought its 'J' organization, developed at El
Alamein. Prior to the entry of Eighth Army into the theatre, no 'J' service
was functioning in Tunisia. Instead, two 'Phantom' squadrons operated
in North Africa, one with II US Corps, and one with First Army.

'Phantom' units were originally formed in 1939 to locate forward troop
positions for the RAF, but developed into a system to pass intelligence to
higher commanders. Both systems were considered invaluable to their
respective client formations, so much so that in late February, it was
proposed that 'Phantom' and 'J' units be amalgamated. This proposal
was met with resistance from First and Eighth Army sources, because any
attempt to amalgamate 'J' and 'Phantom' units would require abandoning
their proper functions entirely. This was because 'Phantom' patrols were
essentially mobile, with their Intelligence Officers having to "move about
a great deal over the battlefield." Their task did not tie them to a
particular place or unit, and it was felt to be a waste of specially trained
Intelligence Officers to force them to undertake 'J' work.

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27 Ibid.
28 Brooks, op cit, p.383; Carrington, op cit, p.38.
29 PRO WO 175/16 HQ 18 Army Group G (Ops) Memorandum on the Visit to Adv HQ First Army
and HQ 'E' Squadron GHQ Liaison Regt to discuss possibilities of amalgamation of 'J' and
Phantom Units, 27 February 1943.
30 Ibid.
By contrast, ‘J’ units had to be static. The necessity of having a rear link “in continuous touch with Army HQ” in order to pass information quickly, did not mix well with mobile operations. It was also felt that the mountainous country in much of Tunisia would require stationing ‘J’ detachments where good reception could be assured, and once such sites were located, they should not be moved except in urgent circumstances.

After considerable discussion, however, it was decided that while no amalgamation was possible, establishing a joint ‘Phantom’ and ‘J’ office at advanced Army Headquarters would be beneficial, and that “Phantom Patrols and ‘J’ detachments in the field [could] be of great help to each other.”

The Air Support Control system became an important element of both the communication and the intelligence gathering and dissemination systems, much as it had been in the Western Desert. To ensure that an adequate air support system was functioning in Tunisia, the officer responsible for the creation of the Western Desert Air Force’s system (Lt. Col. J.M. McNeill) was attached to the G (Air) section of HQ 18th Army Group in February 1943. Although it was not possible to standardize completely the procedures within First Army, II U.S. Corps, and Eighth Army, the principles behind the close air support systems for each were the same.

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31 Ibid.
32 Ibid.
33 PROWO 175/16 Discussion of proposed amalgamation of ‘J’ and Phantom Units, Appendix ‘A’, 25 February 1943.
34 Ibid.
Reflecting experience gained in the desert fighting, combined army/air headquarters were established for the major ground formations. First Army formed a combined headquarters with 242 Group RAF; II US Corps had a combined headquarters with XII ASC; the Western Desert Air Force continued its association with Eighth Army. At each of these combined headquarters was an AASC. The well-tested combination of 2/5 AASC at HQ WDAF/Eighth Army was continued and imitated at 242 Group by 9 AASC, joined by 7 AASC in mid-March 1943. XII ASC had its own air support system that was very similar to the British system. Additionally, 7/9 AASC and 12 ASC had rear communication links to the newly created Tactical Bomber Force, which had been formed at Coningham’s insistence and under his control, out of the light and medium bomber squadrons in Tunisia so they could be easily used for close support.

18th Army Group staff had “a G I and G III Air, who combined the duties of a main air support control...with the coordination of all photographic and reconnaissance demands which were made by 18th Army Group or which were beyond the scope of the three combined H.Q. concerned.” Furthermore, both First and Eighth Armies had a G2 Air and staff who concentrated on the coordination of intelligence for close air support operations, and II US Corps had a G2 intelligence section working

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35 Ibid.
36 Ibid; Orange, op. cit., p.145.
37 NARA RG 331 Entry 253 MAAF Directorate of Operations and Intelligence, Operations Section, Army-Air Cooperation, Appendix “E”, 13 March 1943.
with the XII ASC operations staff. Moreover, the allotment of liaison officers increased to two for each bomber and fighter wing, and three for each tactical reconnaissance squadron. This was copied directly from the experience of the WDAF, and improved the ability of ground and air commanders to remain 'in the military picture'. Also copied from the Western Desert was the bomb-line, defined as "the expected line of forward troops during the next two hours" during mobile operations, but unique to the Tunisian campaign was that during relatively static operations the bomb-line could be close to the forward line of troops to "afford them the maximum benefit of air effort." This line was submitted along the tentacles or air support parties to the AASC together with reports of enemy air activity and results of Allied close air support operations.

Thus, individual ground formations had quick access to close support aircraft when necessary, but although this seemed to be no different from the situation created for 'Torch' - the dispersion of aircraft without regard to the bigger picture - this was no longer the case. Recognizing that even army commanders had access neither to the total picture nor to all the available intelligence, and might use aircraft for their own purposes at the expense of overall efficiency, Coningham formed a main air support net at

38 Ibid.
39 Ibid.
41 Anderson did not receive Ultra directly until April 1943. NARA RG 331 Entry 253 Box 5, MAAF Directorate of Operations and Intelligence, Operations Section, Army-Air Cooperation, 12 March 1943, Appendix "B".
the combined 18th Army Group/NWATAF headquarters. The purpose of this system was to connect all three AASC's with all available intelligence by a reliable communications network. Thus all three AASC's and the main air support control were in constant touch, knew which targets were being attacked, the strength and time of the attacks, and the results. The ability to keep in touch with the system, combined with improvements to the intelligence system, enabled HQ 18th Army Group/NWATAF to redirect fighters and fighter/bombers, to “apply the Tactical Bomber Force where most vital, and if necessary to call in the additional weight of the Strategic Bomber Force.” Thus, the command structure and communication system was in place to make use of intelligence, but the intelligence system had to be reorganized and integrated before the full value of the changes could be appreciated.

The full value of Ultra was realized when the previously unsatisfactory arrangements for Ultra exploitation which had plagued this source were largely overcome in February 1943. The procedure for disseminating Ultra decrypts was streamlined so that they were signalled directly from GC&CS to both HQ 18th Army Group and HQ Northwest African Air Forces, but not directly to First Army until April 1943.

Receipt of Ultra, however, did not ensure accurate intelligence. Indeed, the inexperience of both British and American intelligence staffs in Tunisia

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42 NARA RG 331 Entry 253 Box 5 MAAF Directorate of Operations and Intelligence, Operations Section, Army-Air Cooperation, 31 March 1943.
43 Ibid.
led to difficulties. The best example came prior to the Kasserine battles, when they relied on Ultra too heavily, resulting in a failure to predict accurately the offensive. In general, however, Ultra was an excellent source for strategic intelligence, becoming more so as intelligence staffs became more experienced and integrated into operational planning. Near the end of the campaign, however, the value of Ultra was degraded by an increased reliance, by the Axis armies, on landline communication. But by this time, the Allies were sufficiently competent to make up for the lack of Ultra through other sources.

The value and importance of 'Y' intelligence had become as apparent to both air and ground commanders in Tunisia as it had been to commanders in the Western Desert. This was particularly revolutionary for the American commanders who had expressed doubts about the tactical value of 'Y', and is at least part of the explanation for the failure to provide 'Y' units for 'Torch'. With the approach of the British forces pursuing Rommel's forces from Egypt, the 'Y' units in the Western Desert and Tunisia began broadcasting collated 'Y' intelligence reports to their various customers, resulting in a more accurate picture of enemy order of battle and movements and increasing the value of this source. This combined with the increasing technical competence of both air and ground 'Y' personnel, something which increased and enhanced contact

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45 Clayton, op. cit., pp.265-266.
between inexperienced Tunisian 'Y' units and their more experienced Western Desert counterparts.

There was very little change in the number of 'Y' units operating within the Mediterranean theatre, but the advancing Eighth Army had shrunk this theatre significantly. The RAF's 276 Wing, whose headquarters also operated as a W/T interception unit, commanded five additional W/T units and four R/T units to provide 'Y' intelligence to the WDAF and Headquarters RAF Middle East. This unit was augmented by Number 380 Wireless Unit which provided W/T coverage, and 381 Wireless Unit consisting of two smaller R/T units one each covering German and Italian traffic. In addition, No. 381 Wireless Unit also sent a small section to the USAAF's XII ASC. The US II Corps also had its own 'Y' unit covering W/T, with two smaller detachments, one covering W/T and the other controlling R/T. Supplementing these 'Y' units were several airborne investigation units detecting and countering German radar and beam navigation systems. Where previously there were 25 officers and 231 men staffing the Tunisian 380 and 381 Wireless Units and their associated field units, the approach of 276 Wing increased the number of RAF 'Y' personnel to 188 officers and 1,811 men.

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46 NARA RG 331 Entry 258 Box 7 MAAF Director of Operations and Intelligence, Intelligence Section, Signals Intelligence Subsection, Memorandum entitled Mediterranean "Y" Cover, from Chief Signals Officer, Mediterranean Air Command to the Deputy Air Commander-in-Chief, Mediterranean Air Command, 6th May 1943.


48 NARA RG 331 Entry 258 Box 7 MAAF Director of Operations and Intelligence, Intelligence Section, Signals Intelligence Subsection, Memorandum entitled Mediterranean "Y" Cover, from Chief Signals Officer, Mediterranean Air Command to the Deputy Air Commander-in-Chief, Mediterranean Air Command, 6th May 1943.
Operational control, including planning and regrouping of ‘Y’ units was vested in the Chief Signals Intelligence Officer Mediterranean Air Command, who was responsible to the Air Officer Commanding-in-Chief through the Chief Intelligence Officer to ensure that adequate ‘Y’ intelligence was provided to the subordinate commands. With the reorganization of command structures, ‘Y’ intelligence was increasingly integrated into operational planning. ‘Y’ intelligence officers worked closely with operations and intelligence officers at the Group operations room, allowing them to coordinate ‘Y’ with radar and other intelligence to keep close track of the ever-changing enemy locations and habits.

Incoming R/T of operational use to air operations, such as “early warning of raids, enemy tactics, dispositions of patrols, locations, morale and similar intelligence” was passed to the Group controller, and to HQ NWATAF. Also circulated to higher command was “a brief digest of the day’s traffic through their operational group to Intelligence [NWATAF] and thus a continuous appreciation of the opposing enemy fighter force was able to be maintained and, correlated with other intelligence, passed to the Groups, Wings and Squadrons in the field, preventing unnecessary losses.”

The reorganization and integration of air ‘Y’ allowed for a more accurate picture of enemy air movements and so helped to direct close air

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48 Ibid. Both of these officers were from the RAF.
50 PRO AIR 23/1710 Memorandum entitled Wireless Intelligence circulated by the Chief Intelligence Officer, NATAF, 13 May 1943.
51 Ibid.
support operations away from harm. It also helped the NWAAF to attack Axis efforts to re-supply the Tunisian theatre by air. Operation ‘Flax’ was an attempt by Allied air forces to choke off these efforts.\(^2\)

These operations made use of various forms of intelligence (including ‘Y’) to locate incoming enemy transport aircraft, which were then attacked by Allied fighters. For example, ‘Y’ intelligence traced the routes of the Me 323s and JU 52s which included a “growing tendency for aircraft to make an intermediate landing in Sardinia” on their way from Naples to El Aouina or Bizerta airfields.\(^3\) On 5 April 1943, two Allied flights attacked enemy transports over the Sicilian straits, while B-17s bombed the Bizerta and Tunis aerodromes to destroy those transports which got through.\(^4\)

The abysmal state of First Army’s ‘Y’ arrangements was not remedied until February 1943, when it was brought under the direction of experienced staff from Cairo and reinforced by a ‘Y’ unit from Eighth Army after 18\(^{th}\) Army Group was formed. It was not until 20 February 1943 that Army ‘Y’ produced its first operational decrypt, and at roughly the same time its traffic analysis ability significantly improved. This was due to a better organisation, the quality of ‘Y’ staffs, and that the German Army’s signal network, which had been confused and unsettled, began to operate in a more predictable fashion.\(^5\) Thus, for both the ground and air

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\(^3\) NARA RG 331 Records of Allied Force Headquarters, Box 74 Reel 38-C, RAF (Middle East) Wireless Intelligence Service, Routes of German Transport Aircraft, Report No.4 of 5 April 1943.

\(^4\) Howe, op. cit., p.601.

\(^5\) Hinsley, op. cit., II, p.745.
forces 'Y' became a much better source for strategic, operational and tactical intelligence.

In both structural and qualitative terms, the interrogation of prisoners of war also improved dramatically following the reorganisation of early February 1943. Previously, British First Army operated No. 15 Prisoner of War Interrogation Service, and II U.S. Corps operated its own separate interrogation unit, followed by the prisoners being shipped to the United Kingdom for detailed interrogation.66 The Eighth Army operated their own unit, CSDIC Middle East, and had achieved great success with prisoner of war interrogations. The fact that no integrated system for dealing with prisoners had been worked out before 'Torch' was largely due to an underestimation of the scale of the operation. The Americans had no intention of having a larger organisation for interrogation. Their provisions were for forward interrogation to be undertaken “by teams attached to divisional H.Q. or cages, with no co-ordination between the teams.”67 This method proved far too wasteful, and although it produced valuable operational intelligence for the divisional commander, the source was not fully exploited.

In February 1943, the separate British and American interrogation units operating in Tunisia were amalgamated to form the Allied Captured Intelligence Centre in Algiers. In March, French representatives were

66 PRO WO 208/3478 CSDIC and PWIS's - General Policy, undated.
67 PRO WO 208/3248 Notes on CSDIC Mediterranean, undated, Part 1, p.3; PRO WO 208/3478 CSDIC and PWIS's - General Policy, undated. Teams of between two and six interrogators were allocated per Corps, with a further eight or ten at Army Headquarters to be sent forward as needed.
attached to this unit, and in May 1943 following discussions with
CSDIC Middle East, this Centre was reorganised as CSDIC (AFHQ). This
final step came just before the end of the Tunisian campaign and does not
seem to have affected the interrogation system, but even amalgamating
the separate British and American units and having them communicate
with the experienced CSDIC Middle East improved the situation
dramatically.

Experienced interrogators again proved able to gain valuable
intelligence from prisoners of all ranks and nationalities. For example,
General von Thoma, the commander of the Afrika Korps during the
second El Alamein battle, provided information on the Mareth defences in
time to affect the planning of the attack on that position. He told of
defences that were “sufficient defence against the Arabs, but nothing
more”, and that 40,000 men held them, not the 150,000 troops the
British thought might be deployed there.

Operating hand-in-hand with prisoner of war interrogation was the
exploitation of captured documents. Not only did these provide useful
information on their own, but could also be used in conjunction with other
information during an interrogation to convince a prisoner that the
interrogating officer already knew all about his unit, its equipment, and its
function, thus helping to convince the prisoner to cooperate. The
disjointed provisions for POW interrogation initially impeded this process,

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58 Hinsley, II, p.32.
59 WO 208/4197 German and Italian Prisoner of War Interrogation reports
M159 General Thoma – General der Panzertruppe – Captured MIDDLE EAST, 4 November 42.
but the formation of a G-2 (Captured Documents) section at AFHQ, the assignment of trained specialists from 18th Army Group to forward units, and directives on proper procedures for dealing with captured documents made this source more productive. Examples of captured documents included enemy signals and codebooks from the papers of "Luftnachrichten Stelle (Air Signals Station)", and a collection of "Secret Orders and Decrees for German army and air force personnel in Italy and Sicily." These and other items aided in the reconstruction of enemy standard operating procedures, which could then be used in operational planning.

As it had in the Western Desert, strategic intelligence aided in focusing operational intelligence gathering, such as aerial reconnaissance. 225 Squadron RAF undertook tactical reconnaissance for First Army under the operational control of 242 Group, whose fighter control centre also detailed the missions of 154 Squadron from XII ASC. Because of the experience of 225 Squadron, and the relative inexperience of 154 Squadron, 225 Squadron flew most missions. Five of the twelve Spitfire V aircraft were fitted with oblique cameras, and all of its four Mustangs

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60 PRO CAB 106/1220 The Structure of A.F.H.Q., undated; NARA RG 331 Records of Allied Force Headquarters Box 72 Reel 6-C Allied Force Headquarters, Office of Assistant Chief of Staff, G-2 Memorandum on Intelligence Procedures, 10 February 1943. WO 208/4197 The volume of interrogation reports increased substantially after February 1943.
62 Cross with Prof. V. Orange, op cit, p.243, also p.245. When Cross discovered that the US armed forces had no liaison section similar to the RAF's system in which the air force was taught what the army wanted, and the air force taught the army what was possible, he had 225 Squadron RAF to respond to reconnaissance requests from II Corps. When Bradley saw the difference between the American and British reconnaissance reports, he asked if 225 Squadron could handle all requests.
were fitted for and were used in vertical photographic missions. There was also one Hurricane in reserve that could carry vertical and oblique cameras simultaneously. In addition to these aircraft were two squadrons of Spitfires providing tactical reconnaissance for Eighth Army. NWATAF was able to direct any of these aircraft against any area within range, increasing the flexibility of the source. Supplementing this were general observations made by aircraft on other missions, reported to and circulated by squadron intelligence officers and ALOs. Generally, though, the quality of the reports was far better from trained reconnaissance pilots.

The control of tactical reconnaissance aircraft by 242 Group was a distinct improvement over having them attached and controlled by individual Corps, as had been the case. Each evening, a conference was held between representatives of First Army and 242 Group to schedule requested reconnaissance requirements of Corps and Army. The AASC passed any requests for reconnaissance or photography from Corps or Army by telephone to the Reconnaissance Wing Commander at 242 Group, who either accepted the request and passed the order to the squadron via the Group Controller, or rejected the request if unable to comply. It was the responsibility of the Squadron Intelligence officer and the ALO to brief the crews on the mission requirements. The reconnaissance missions were then passed to the Fighter Group Controller.

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64 Ibid.
that was, as had been developed in the desert, the main controlling and coordinating centre of aircraft operations. This system worked quite well, and of the 272 tactical reconnaissance missions requested between 18 April and 12 May, 256 were successfully completed. Similarly, of the twenty-seven requests for tactical photography, twenty-five were accepted and completed. Urgent information from tactical reconnaissance, as well as debriefing reports of returning fighter and bomber crews, was broadcast immediately over the AASC links as soon as they were received, followed by a more detailed written report.

A major enhancement in the exploitation of photographic intelligence was the equipping, in early 1943, of the Photographic Reconnaissance Units in the Western Desert, Tunisia, and Malta with Mark IX Spitfires. In February 1943, the North African Central Interpretation Unit (NACIU) was placed under the control of the newly created Northwest African Photographic Reconnaissance Wing (NAPRW). The NACIU was expanded to forty-three RAF interpreters and four USAAF interpreters. First Army maintained the First Army Photo Centre to which an RAF officer from NACIU was attached. In addition, a further 23 interpreters

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67 Ibid.
68 LC Papers of Carl Spaatz I: 12 Memorandum from Major General McCreery CGS to NWATAF, 12 March 1943.
69 PRO AIR 41/7 Photographic Reconnaissance, Vol. II pp. 62–65; NARA RG 331 Entry 250 Box 4 MAAF Director of Operations and Intelligence, APO 650 14 April 1943.
70 NARA RG 331 Entry 250 Box 4, MAAF Director of Operations and Intelligence, Air Plans Section, Northwest African Photographic Reconnaissance Wing, 27 February 1943.
71 Ibid.
were on strength of AFHQ to be attached forward to Corps and
Division as necessary. All these separate interpretation pools, although
not on NAPRW strength, maintained liaison with the main unit. This was
only possible with the improvements to the C^l systems.

The control of photographic intelligence passed to the newly formed
HQ NWAAF in collaboration with AFHQ. GSI 18th Army Group and HQ
NWATAF controlled photographic reconnaissance in direct support of
ground troops. The NAPRW itself was responsible for drawing up a
schedule of PRU commitments, and assigned “necessary PRU aircraft and
personnel, as well as special processing and interpretation personnel to
work with the Northwest African Tactical Air Force.”

The units providing photographic intelligence for tactical air
operations were the USAAF’s 3rd Photographic Group, Nos.4 and 2 PRU
(reorganized and renamed 682 and 680 Photographic Reconnaissance
Squadrons), and 60 South African Air Force Survey Flight for taking
photos for battlefield maps. However, a somewhat backward step was
taken by assigning detachments of four Spitfires from 682 Squadron and
d five P-38s from the USAAF 3rd Photographic Group to First Army during
and after the German Kasserine offensive in February 1943. Another
such step was taken late in the campaign when 154 Observation

72 Ibid.
73 NARA RG 331 Entry 270 Box 2, Mediterranean Allied Photographic Intelligence Wing, 1943.
74 Ibid.
75 NARA RG 331 Entry 270 Box 2 Photographic Reconnaissance Chapter 1, The Algiers Period;
PRO AIR 23/6570 Message for Spaatz from Bottomley at the Air Ministry in Whitehall, 8 February
1943.
76 Ibid.
Squadron, equipped with P-51 Mustangs equipped to take both vertical and oblique photographs, relieved NAPRW from taking battlefield photographs for II Corps. However, interpretation sections were provided to interpret the photographic intelligence from these aircraft, and the rational command structure and improved communications allowed the intelligence to flow with limited delay.

The reorganization of photographic intelligence efforts under a single controlling formation was a positive step in its evolution to a mature intelligence source. Although competing agendas did not allow this to occur completely, the resulting arrangements were a distinct improvement over the previous situation. Indeed, the arrangements that did evolve were, at the level of NWATAF, similar to the formation of 285 Reconnaissance Wing in the Western Desert during the summer of 1942. All available photographic aircraft could be used where strategic intelligence had indicated they would be of most value, and the provision of suitable technical and interpretation personnel ensured that operational intelligence could be used.

In view of the need to minimize the number of escorting fighters required for reconnaissance missions, the P-51 was considered to be “the most suitable aircraft for reconnaissance and intelligence photography”, but until suitable numbers were available, A-20s with heavy fighter escort were used satisfactorily. As in the desert, the aircraft operated in

77 Craven and Cate, II, op. cit., p.169.
78 NARA RG 331 Entry 251 Box 1 Mediterranean Allied Air Force Director of Operations and Intelligence, Air Staff Registry, XII Air Support Command Operations in Tunisia, 23 June 1943.
pairs, with one aircraft conducting the reconnaissance while the other
looked for enemy fighters and anti-aircraft emplacements. These tactics
worked quite well, and between 18 April and 12 May, only one aircraft
was lost from 225 Squadron, and three from the less experienced 154
Squadron, conducting tactical reconnaissance.† Combat experience,
translated into a standard operating procedure, showed that it was best
to fly at between 4,000 and 7,000 feet to avoid the deadly light flak
(which accounted for more casualties than Bofors or heavy flak).††
Moreover, greater accuracy was achieved by avoiding low flying, because
it was “harder to pin-point accurately when flying low, especially when
maps [were] unreliable.” ††† This was because more concentration had to
be devoted to flying one’s aircraft when flying low, and thus many details
were missed. To avoid losses while photographing a large area, for
example, the area was sub-divided into smaller strips and photographed
by a number of aircraft. This system “was adopted with considerable
success on 5 May 1943, prior to the final offensive when a large area
near Furna was required for location of gun positions and minefields.” †‡
Determining the location of minefields was an important part of
developing a successful battle plan, and the location of gun positions
offered good targets for close air support. Valuable intelligence was

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80 RG 18 Entry 7, World War II Combat Operations Reports 1942-46, Box 2280 52nd Fighter Group Reports show that when following these standard procedures, the effect of enemy flak was lessened.
81 Ibid.
82 Ibid.
obtained through both of these sources, and thus close air support
and interdiction missions were guided to their targets as accurately as
possible.

With the sweeping improvements to the C³I system, the ability to
apply close air support quickly and effectively was substantially
enhanced. Similar developments occurred for the WDAF and Eighth Army
in mid-1942 with similar results. The effect of these changes was
immediate and manifested itself in unprecedented support of land
operations from the air. Adding to this ability was the development of
tactics to suit Allied aircraft. Many of the training memoranda from the
WDAF were re-issued to the NWATAF, who had been producing their
own based on combat experience.® Another important development was
the standardization, and circulation to all affected parties, of ground
recognition signals. Ground and air units were trained in the proper use of
these signals, improving the ability of important tactical intelligence to be
received and acted upon.® The importance of such signals was well
understood by all parties, something that substantially improved the close
air support system.

The offensive that became known as the battles of the Kasserine
ass took place at roughly the same time as the reorganization of Allied
air, ground, and intelligence units, but it did not impact on this battle.

Ironically, as the Allied forces were being unified as never before, the Axis

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® NARA RG 331 E251 MAAF Directorate of Operations and Intelligence, Boxes 1 and 2 contain
the bulk of these memoranda.

® NARA RG 331 Entry 253 Box 5, Recognition Signals, 2 March 1943.
forces were experiencing the difficulties associated with disunity of command. Aerial reconnaissance of the area around the Kasserine Pass and Tebessa in southern Tunisia brought Rommel to the "conviction that the time was ripe for an all-out thrust to Tebessa." This decision was firmly opposed by General von Arnim, the commander of 5th Panzer Army in northern Tunisia. He intended to remove 21st Panzer Division from its forward area for refitting, and to transfer 10th Panzer Division to the Kairouan area in east-central Tunisia to be used in his own planned offensive in the area west of Tunis. Rommel won this debate by signalling Comando Supremo, proposing that he launch an immediate attack on Tebessa "from the southwest with 10th and 21st Panzer Divisions under command." Shortly thereafter, Field Marshal Kesselring's Assistant Chief of Staff (Colonel Westphal) telephoned von Arnim from Rome and countermanded his planned offensive, and his transfer of 21st and 10th Panzer Divisions. Von Arnim displayed his displeasure at these developments by refusing to support Rommel's offensive at key points and with key material. Before the start of the operation, Rommel claimed in his memoirs, "we had asked von Arnim to send us the 19 Tiger tanks which were with the Fifth Panzer Army...But von Arnim refused our request, saying that all the tanks were under repair, a statement which we later discovered to have been false."
Undoubtedly assisting the decision to attack as Rommel had suggested was the presence of troops from the inexperienced American II Corps along the planned axis of advance. The Axis were of the opinion that the American army did not possess the "important pre-requisite of an experienced officer corps", there was no close cohesion within the units, and "the bearing of the officers and NCOs [was] much less firm and pronounced than [was] the case in the German Army." This opinion was shared amongst British commanders including Alexander and, perhaps less surprisingly, Montgomery. In a message to the War Office on 19 February, Alexander described the situation as far from satisfactory. British, American and French units are mixed up on the front especially in the south. Formations have been split up. There is no clear policy and no plan of campaign. The Air is much the same. This is the result of no firm direction or centralized control from above. British are in good heart and have fought well. Americans are ignorant, ill-trained and rather at a loss consequently not too happy...We have quite definitely lost the initiative."

Although Alexander was correct about the Americans being inexperienced in battle, they proved to be as able in combat as the British in a very short period, and learned some lessons faster than the British army had during the initial campaigns in the Western Desert. However, it is true that neither the II US Corps nor the XII ASC had gained much experience prior to the Kasserine offensive. The initial role of II Corps was to provide "a
strategic flank guard for our main forces in the north. Much of the initial success of Rommel’s offensive was due to it being directed at green troops.

The object of this offensive was ambitious given the precarious supply position of the Axis forces in Tunisia, and the ground over which they were to fight. Rommel was to use all available troops from the Italian Army, as well as 10th and 21st Panzer Divisions, and strike at Le Kef through Faid and Sidi Bou Zid. As the Eighth Army was slowly moving into position around Mareth, no advance was expected for at least a week. Supporting this from the north, von Arnim’s forces were to pin down the Allied forces in the area by local action, and a more broad attack between the coast and Pont du Fahs.

Because many of the orders relating to the offensive and its goals were transmitted by means other than radio, Ultra missed many of the clues. Ultra did show some evidence of von Arnim’s covering offensive in the west, and showed the move of Axis aircraft to the Kairouan area, but gave no clear indication where the blow would fall. Indeed, this lack of experience with Ultra had proven disastrous for the British during Rommel’s first advance in 1941, and was replayed during the Kasserine

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92 Eisenhower, op. cit., p.139.
93 PRO CAB 146/25 The Axis in Tunisia, February 1943. After Rommel’s Medenine offensive, which began on 6 March, Axis troops in southern Tunisia were renamed 1st Italian Army under General Meese, along with von Arnim’s 5th Panzer Army in the north. Both formations were part of Panzer Army Group Africa.
94 Ibid.
95 Bennett, op cit., p.201.
offensive. Once the operation began, however, Ultra proved invaluable in predicting its scope.

The offensive achieved startling initial success against bewildered American forces, and by 17 February, American ground units were being driven out of Sbeitla and air units from the airfields at Feriana and Thelepte to inferior ones further west. Having retreated some fifty miles across the arid plain from the Eastern to the Western Dorsale Mountains, the Americans (aided by both French and British forces) made a stand at the Kasserine Pass. This pass was important because it gave access to the supply and administration bases at Tebessa and Le Kef, the loss of which could have forced a general retreat by Allied forces from Eastern Tunisia.  

Aiding the Allies in this battle was the more unified control of air support aircraft under the newly formed Allied Air Support Command commanded by General Kuter. Aircraft from XII ASC and 242 Group could be, and were, directed by General Kuter against ground targets. Bad weather prevented 242 Group from participating in the battle until the night of 16 February when the Bisley Wing was able to drop nearly twelve thousand pounds of bombs on enemy motorized transport near Kairouan. Although XII ASC did what it could to attack enemy vehicles, tanks, and gun positions, the disorganization associated with continually

97 PRO AIR 24/1041 Operations Record book of 242 Group RAF, 16/17 February 1943.
having to evacuate its forward landing grounds combined with bad weather seriously impaired its ability to provide close air support.

On 17 February, Air Marshal Coningham arrived and assumed command of the Allied Air Support Command, which was renamed the Northwest African Tactical Air Force the next day. Coningham immediately signalled both XII ASC and 242 Group, ordering that aircraft be used offensively, rather than defensively as they had been. Close air support operations were directed away from attacking tanks and towards concentrations of enemy troops and soft-skinned vehicles, which were much better targets. Moreover, foreshadowing what would become a standard feature of future battles in Tunisia, the new organization saw the placement of most of General Spaatz’s strategic bombers at Coningham’s disposal. As before El Alamein, the enemy was attacked by both day and night. On 18 February, the Bisley Wing again dropped 12,000 pounds of bombs on enemy vehicles near Fondouk with direct hits being reported on at least fifteen to twenty vehicles.

Owing to increasing pressure from ground and air forces, a lack of support from von Arnim when it counted, and from a deteriorating supply situation, Rommel’s forces began a general withdrawal southeastwards on the morning of 23 February. Tactical reconnaissance from 225 Squadron noted the withdrawal of these forces, and that the road

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89 LC Papers of Carl Spaatz I: Box 10, Memorandum by Spaatz, 23 February 1943.
100 Ibid., 2: Box 270 Air Power in Peace and War, North Africa, undated.
101 PRO AIR 24/1041 Operations Record book of 242 Group RAF, 18/19 February 1943.
between Sbiba-Sbeitla was jammed with traffic. This prompted attacks by 225 Squadron’s Hurribombers, escorted by 111 and 93 Squadrons, followed by similar attacks by 243 Squadron Hurribombers, escorted by 152 and 243 Squadron Spitfires. By night, the Bisley Wing continued to bomb retreating vehicles. Although generally, the air effort was still suffering from a lack of adequate airfields, supply, and intelligence, it was showing signs of increasing potential made possible by the reorganization of land and air forces, and their increasing qualitative and quantitative strength.

After failing to assist Rommel’s success in the Kasserine offensive, von Arnim began his own offensive against First Army in northern Tunisia. First Army, supported by 242 Group that flew over 1,000 sorties during the first five days of March, repulsed this offensive and inflicted heavy losses. Aside from the losses suffered, this offensive delayed Rommel’s offensive against the lead elements of the Eighth Army moving against the Mareth line. The slow, methodical move of the Eighth Army meant that until 26 February, Montgomery had few troops or aircraft forward. But by 6 March when Rommel was finally able to attack, Montgomery had created a formidable defence of some 600 dug-in antitank guns, roughly 400 tanks, and air superiority from the WDAF ready to meet the attack.

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102 Ibid., 23 February 1943.
103 Ibid.
104 Orange, op. cit., p.142.
105 Ibid.
These forces were in position along the known line of Rommel's advance that had been revealed in complete detail by Ultra. Similar to the situation at Alam Halfa, Montgomery used his own knowledge of Rommel in conjunction with excellent intelligence from Ultra to enable him to place his strength where he knew the German blow would fall. Ultra identified the strength and location of the 10th, 15th, and 21st Panzer Divisions, that a total of 31,000 men and 145 tanks were taking part in the offensive, the line of advance, as well as its predicted and actual start dates. Backing up Ultra's prediction was army 'Y' which also gave information detailing the moves of German units. Predictably, the offensive got nowhere and retired leaving at least fifty-two tanks destroyed, and nearly double that damaged. Indeed, the total failure of the offensive led some Axis commanders to believe that the enemy "had wind" of the plan. Kesselring seemed to think the leak came from the Italians, but fortunately for the Allies, no one thought to question the security of the Enigma cipher.

With this defeat, the Axis position in Tunisia was significantly weakened. Its supplies were under continual and increasing attack by naval and air forces, further weakening their ability to mount a serious defence. The Allies, assured of victory given their quantitative and

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106 PRO DEFE 3/801 VM 4907; PRO DEFE 3/802 VM 5028, VM 5050, VM 5068, VM 5095, VM 5111, VM 5182, VM 5197, VM 5207, VM 5244, VM 5262, VM 5273; PRO DEFE 3/803 VM 5722, 6 March 1943.
107 Hugh Skillen, op cit, p.249.
growing qualitative advantage, had to prevent the enemy from escaping from Tunisia intact while limiting casualties. Efficient C²I was the key to this strategy, and this was well in hand by March.

Alexander was faced with two possible plans for bringing about the destruction of the Axis forces. He could use II US Corps to drive a wedge between von Arnim’s Fifth Panzer Army in the north and First Panzer Army in the South, or through a series of offensives, both could be squeezed into a smaller bridgehead in the north until they were unable to deploy either air or ground forces. Alexander chose the latter option in part because he still lacked confidence in the fighting ability of the Americans, a sentiment shared by Eisenhower and Bradley, who was second in command of II US Corps. The first of these offensives came in the south by the Eighth Army against the line, which the Axis had been working to improve for several months by strengthening the fortifications, adding anti-tank ditches and minefields, covering the approaches with “the fire of well defiladed machine-guns and anti-tank guns.” The strength of these defences made “smashing a way through the Mareth line frontally a formidable one.”

Liddell Hart, ed., op. cit., p.421. Rommel believed Eisenhower should have thrown his weight into southwest Tunisia in order to divide the First Italian from the Fifth Panzer Army, following this up by destroying the First Army in conjunction with Montgomery. Then he should have switched his effort to Pont du Fahs or Medjiz el Bab in order to destroy Fifth Army.


Montgomery's attack (codenamed 'Pugilist') began on the night of 20 March, and was designed to "destroy the enemy opposing Eighth Army in the Mareth position, and to advance and capture Sfax." In typical fashion, Montgomery launched a frontal assault at the largest and deepest of the Wadis or water courses (Wadi Zigzao), directly at strong enemy defences. By the time the offensive opened, Eighth Army outnumbered the enemy by four to one in tanks and two to one in troops and artillery, but the attack made little progress. This was despite the absence of the Axis air forces, which had been drawn elsewhere. Coningham had directed Air Commodore Cross, a desert veteran commanding 242 Group, and Major General Paul Williams, commander of XII ASC, to mount attacks against the Luftwaffe's airfields by both day and night to distract their fighters and allow the Western Desert Air Force to concentrate on close air support.

Meanwhile, the New Zealand Corps (consisting of 2 NZ Division and the 8 Armoured Brigade) was sent on a long outflanking manoeuvre along a route thought to be impassable, but the LRDG had found a way through. The New Zealand Division was stopped at the Tebaga Gap (a break in the ridge system between Jebel Tebaga and Jebel Melab, some twenty miles southwest of El Hamma) when the Axis detected the move.

114 IWM Montgomery Papers, BLM 31/4 Operation ‘Pugilist’ General Plan of Eighth Army.
116 Orange, op. cit., p.143, also Cross, p.241.
117 PRO WO 214/11 Most Secret Cipher Message for Prime Minister copy to CIGS from General Alexander 8 March 1943; IWM Montgomery Papers, BLM 31/4 Operation ‘Pugilist’ General Plan of Eighth Army; LHCMA, Papers of Divers 2/5, Account of the “Left Hook” at Mareth.
and reinforced the area. Montgomery, in turn, sent X Corps and the 1st armoured division to reinforce the New Zealanders, and to aid in breaking through the Tebaga gap. An outstanding feature of this battle was the intense close support of the attack by sixteen squadrons of the WDAF flying low-level attacks.\footnote{PRO WO 214/11 Most Secret Cipher Message for PM and CIGS from General Alexander 29 March 1943.}

Similar to the pattern of operations at El Alamein, heavy and continual air attack against concentrations of vehicles and troops of 15th and 21st Panzer Divisions damaged equipment and deprived the Axis of mobility, and its troops of sleep. During the two nights before the attack by the Eighth Army, all available heavy, medium, and light bombers attacked targets located by intelligence and illuminated by flare-dropping Albacore aircraft.\footnote{PRO AIR 23/1708 Comment by AOC Tactical Air Force - The Eighth Army Break-Through at El Hamma, 26th March 1943.} Some 6,000 prisoners taken by Eighth Army reported the tremendous effect of these close air support operations. They “testified to the terrific moral and material effect caused by this air attack.”\footnote{Ibid; Orange, op. cit., p.144.}

In order to allow Tactical Air Force aircraft to operate effectively, the construction of forward airfields was given top priority during the preparatory phases of operation ‘Pugilist’.\footnote{NARA RG 331 Entry 272 Box 34 Operation ‘Pugilist’ General Plan of Eighth Army, 26 February 1943.} Thus, aircraft were able to respond to calls for support, and to re-arm and attack continually throughout the day. The ground operation, which began on 26 March,
was timed to coincide with "light bomber, fighter bombers and strafing efforts in direct support of 2 New Zealand Division and the 8 Armoured Brigade." The air attack operated just ahead of the creeping artillery barrage that formed a nearly perfect bomb-line. Air Marshal Harry Broadhurst, the commanding officer of WDAF, designed an air program that made use of three light bomber Wings, five fighter Wings, and one Tank Buster Squadron. The pilots of these aircraft had been briefed by Squadron Intelligence Officers as to their primary and secondary targets located, in large part, by visual and photographic reconnaissance, backed up by 'Y' reports of enemy locations. Once over the target, tactical intelligence aided in target location, and in denoting friendly troops from the enemy. Orange smoke indicated the line of forward troops, and three letters (A, E and H) were built on the ground the previous day and each pilot was given the pinpoints of their locations, and each formation leader was briefed to orbit the letters before setting course for the target, as a warning to our ground troops that the attack was to start. This, combined with the artillery barrage, ensured that aircraft located their targets, and did not attack friendly troops.

Two new features of this battle were the use of Forward Air Controls (FAC) and the development of the Forward Bomber Control. The FACs were airmen placed in the lead formations with radios that could direct aircraft responding to calls for air support onto their targets. They would become standard in future campaigns in Italy and Northwest

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122 PRO CAB 106/531 MT Instructional Circular No.13, 28 April 1943, p.3.
124 PRO CAB 106/531 MT Instructional Circular No.13, 28 April 1943, p.4.
Europe. Advance Air Headquarters, Western Desert, formed the Forward Bomber Control because the light bomber wings were located so far from advance headquarters that telephone communication could not be guaranteed. Forward Bomber Control was established "with the Fighter Group Headquarters (211 Group) who maintained land-line communications with the Fighter Wings and usually with AAHQ." Targets came to the Forward Bomber Control from AAHQ in the form of either definite targets located by intelligence, or as a general directive to attack targets located by aircraft returning from missions. Thus, aircraft were directed as accurately and as quickly as possible to their targets. This Forward Bomber Control operated throughout the rest of the Tunisian campaign.

The constant attack kept the enemy troops pinned down and reduced their firepower, encouraged friendly troops, and destroyed or damaged enemy equipment. A total of 514,000 pounds of bombs were dropped in close support of the ground forces on 21 March alone, and this pattern continued throughout the operation. The fighter Wings alone claimed 85 motorized transports destroyed and 210 damaged, and seven gun emplacements destroyed with a further eight damaged. The terrific effect of the aerial assault was similar to that during Alam Halfa and El Alamein, and was only possible because of good intelligence and

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126 PRO AIR 23/1818 Report on Forward Bomber Control, May 1943
126 Ibid.
127 PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia, p.400.
128 PRO CAB 106/531 MT Instructional Circular No.13, 28 April 1943, p.4.
coordinated efforts brought about by improvements to the C^l systems of the Allied forces.

These improvements allowed for effective use of the Hurricane IID Tank-Buster aircraft, which had been unable to act in previous offensives because of their vulnerability to Axis fighters and anti-aircraft fire. A particularly successful attack took place on 22 March when twenty Hurricane IID’s of 6 Squadron, escorted by fighters from 239 Wing, attacked a concentration of tanks and vehicles located by tactical reconnaissance. The attack claimed twenty Mark III Panzers hit with four being set on fire, 12 Mark IV Panzers hit and one set on fire, five lorries and one 88mm anti-tank gun destroyed.\textsuperscript{128} Another raid claimed fourteen tanks destroyed.\textsuperscript{130}

After the battle, Montgomery praised the close air support efforts of the WDAF by writing to Coningham and Broadhurst, saying

I would like to convey to you my great appreciation of the superb support to the land battle that has been given by the Air Forces under your command yesterday, and in fact every day since the battle began. Such intimate and close support has never to my knowledge been achieved before and it has been an inspiration to all the troops. Please convey to all Commanders and all the pilots the grateful thanks of myself and the whole Army for their truly magnificent effort.\textsuperscript{131}

According to Montgomery, the “outstanding feature of the battle...was the air action in co-operation with the outflanking forces.”\textsuperscript{132}

\textsuperscript{128} PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia, July 1942-May 1943, p.502.
\textsuperscript{130} PRO AIR 23/1710 Report on Operations of the NWATAF in the Tunisian Campaign 18 February - 12 May 1943.
\textsuperscript{131} PRO CAB 108/531 MT Instructional Circular No.13, 28 April 1943, p.3.
\textsuperscript{132} Richards, II, p.266.
Coningham too was quite pleased with the operation, which he referred to as "an example of the proper use of air power in accordance with the principle of concentration." He further wrote that such results could not be achieved unless the control of air forces was centralised in the Air Commander working closely in co-ordination with the strategic direction of the Army or Army Group Commander concerned.

With this successful coordination of ground and air forces, the Mareth position was outflanked and the Axis forces began a rapid withdrawal northwards to the Wadi Akrit position. Ironically, it was Rommel's belief that this position, which was far stronger than the Mareth defences, should have been the first position occupied by First Panzer Army when it reached Tunisia. On the 24th, von Arnim had withdrawn the Italian forces to Wadi Akrit, acknowledging the loss of the Mareth line before it occurred and preparing for the next phase.

The reorganization of ground, air, and intelligence units began to take effect at the end of the Kasserine offensive. It allowed for more damaging close air support operations like those at Mareth, but also allowed the Tactical Air Force to harass the retreating enemy, and to further damage his supply organization. This worked in combination with attacks against attempts to re-supply by sea and by air, conducted by the

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133 PRO AIR 23/1708 Comment by AOC Tactical Air Force - Operations N. Africa, Report of the air action which contributed to the break-through of the Eighth Army at El Hamma, April 1943.
134 Ibid.
135 NARA RG 331 Entry 272 Box 34 Report on Operations in Tunisia, Phase II from 15th March to 6th April 1943; Liddell Hart, ed., op. cit., p.392. Rommel felt it was not possible for his mobile forces to hold fronts at El Hamma and Gafsa, and to hold the Mareth line. He also knew the position could be outflanked by experienced British desert troops.
Strategic Air Force and the Coastal Air Force. For example, while the ground forces were pursuing the retreating Axis forces towards Wadi Akrit, the Desert Air Force harassed the retreating enemy by attacking concentrations of trucks and troops whenever they accumulated. These efforts were continued by day and night not only by the Desert Air Force, but also by XII ASC, the Tactical Bomber Force, and even 242 Group when the enemy came within range. Strategic intelligence reported the Axis retreat to Wadi Akrit, which focused operational intelligence efforts in a very cost-effective manner. This, in turn, depended upon close liaison between the various parts of the Tactical Air Force and its rational command structure, competent leaders, and tolerably efficient communications. The symbiotic relationship between all these elements was thus well understood by most Allied commanders.

One important exception to this was General Patton, promoted to Commanding Officer II US Corps after the Kasserine battles, who felt that aircraft operating in his command area should be under his control. Stress over the failure to make progress against the Axis forces, combined with a fundamental misunderstanding of the role of air power, led to what Tedder referred to as a "major crisis in Anglo-American relations", and shows the importance of the individual in the C²I system. This manifested itself in a routine situation report that included a rebuke

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137 Ibid.
138 Tedder, op cit, p.411.
of the efforts of the NWATAF after a light raid by a dozen Luftwaffe aircraft on his headquarters. The signal complained that Patton’s troops had been “continuously bombed all morning”, and that a total “lack of air cover for our Units [had] allowed [the] German Air Force to operate at will.”139 This inaccurate and unfair statement incensed Coningham who fired back his own equally ill-conceived and unfair signal, which read

If [situation report] is in earnest and balanced against above facts, it can only be assumed that II Corps personnel concerned are not battleworthy in terms of present operations.

In view of outstandingly efficient and successful work of American Air Command concerned, it is requested that such inaccurate and exaggerated report should cease. 12th ASC have been instructed not to allow their brilliant and conscientious air support of II Corps to be affected by this false cry of ‘wolf’.140

Although Tedder and Eisenhower both forced apologies from the two officers, this event foreshadowed difficulties in Anglo/American relations which in future campaigns at times proved costly. This incident nearly caused Eisenhower to resign. Indeed, even in Tunisia there were difficulties arising between British and American ground units. So much so that a survey of enlisted men in the Middle East in May 1943, found that “71% of the American enlisted men in the area [said] there [was] much ill-feeling between Americans and British.”141 This was made worse by the superior attitude displayed by the Eighth Army whose own repeated failures had been forgotten as it advanced northwards in Tunisia towards the Wadi Akrit position.

140 Tedder, pp.410-411.
141 NARA RG 377 Entry 55 Box 965 What the Soldier Thinks No.2, August 1943.
Although Wadi Akrit was a formidable defensive position difficult to outflank, the Axis forces offered only token resistance to the advancing Eighth Army. The enemy positions were followed by both photographic and tactical reconnaissance, showing the continuous move northward of Axis transport that indicated the Axis only intended to fight a delaying action at Wadi Akrit. Once the withdrawal northward began, it was only halted at the Enfidaville position some 150 miles to the north. They arrived on 11 April, two days ahead of Eighth Army and under continual aerial attack by not only the Desert Air Force, but also XII ASC and 242 Group. Allied intelligence located some of the best targets yet in the campaigns in North Africa. The effect of NWATAF attacks was so damaging and disorganizing to the enemy that his columns were “split up over the whole area into small sections which dispersed immediately on the approach of our aircraft.” Once the enemy reached Enfidaville, the Allied Air Force’s pattern of constant aerial attack by day and night was continued against the Axis forces, which were now united along a 100-mile arc from Enfidaville to Cape Serrât on the North Coast of Tunisia.

When the Eighth Army reached the Enfidaville line, it was decided to switch II US Corps to the north coast to relieve the British V Corps. On its right in succession was First Army, followed by XIX French Corps and Eighth Army. Alexander’s plan for the final assault was issued on 16

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142 PRO AIR 41/33 The North African Campaign November 1942-May 1943, p.179.
143 PRO AIR 41/50 The Middle East Campaigns Vol. IV Operations in Libya, the Western Desert and Tunisia, July 1942-May 1943, p.516; NARA RG 165 P File Box 5 HQ NWAAF A-2 Section, Weekly Intelligence Summary No. 21 from 3 April to 9 April. This intelligence summary is the first to report a serious decline in Axis morale.
April, and envisaged a four prong offensive beginning with Eighth Army attacking the Enfidaville position on 19 April to draw enemy forces away from First Army and to prevent him from withdrawing into the Cape Bon area. The next phase was for British IX and V Corps to attack towards Tunis on 22 April, and for II US Corps to attack towards Bizerta on 23 April. Air power figured prominently in each of these attacks, with the Allied air forces enjoying superior numbers, serviceability, and unprecedented access to airfields close to the front.

Before the assault began, however, the flexibility of the Allied Air Forces, made possible by improvements in C^3I, allowed their combined weight to be focused against enemy supply. During the entire campaign, Coastal Air Force units, combined with those from Malta and guided by Ultra, had been attacking supply by sea. In the first five months of 1943, the Axis lost 3,100 men and 102,000 tons of material to interdiction strikes against shipping. During April alone, supply losses for the German army amounted to 15,516 tons excluding heavy weapons and tanks that added to the total.

With the move northward by the Axis, sea and air re-supply convoys were within range of the Tactical Air Force. Signals Intelligence, both Ultra and 'Y', revealed that “air transport had operated mainly from Naples with stops in Sicily and terminal airfields at Tunis and Bizerta.”

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144 Orange, op. cit., p.152.
145 Sadkovich, op cit, p.343.
146 PRO CAB T46/27 The Axis in Tunisia The End in Africa April-May 1943, Appendix 30, p.15.
147 PRO AIR 41/33 The North African Campaign November 1942-May 1943, p.185. Although Ultra had provided little information on the German army, since it was able to rely on land-line
As sea interdiction increased in potency, air re-supply efforts became much more important with as many as 250 flights per day. To combat this effort, operation 'Flax' was launched by the NWATAF and destroyed much of the available Axis air transport. On 18 April, for example, four squadrons of Warhawks of the 57th Fighter Group with top cover provided by 92nd Squadron intercepted a formation of 100 JU 52s flying low near Cape Bon. During the ensuing combat, fifty-eight JU 52s, two Messerschmitt 110s, and fourteen Me 109s had been destroyed and a further 29 aircraft damaged. These raids continued, culminating in an attack by 7 SAAF Wing of Kittyhawks against a formation of Me 323 Gigants, six-engine transport aircraft, over the Gulf of Tunis. Thirty of these petrol-laden aircraft were destroyed. After this, the Axis abandoned the use of air transport by day, but their night attempts were foiled by night flying Hurricanes and Beaufighters. The USAAF also participated in this interdiction campaign; a particularly notable mission called the "Palm Sunday Massacre" took place on 18 April, in which American pilots shot down more than fifty German transports out of one hundred. During these operations, "the enemy lost 432 aircraft in the air at a cost to [the Allies] of about thirty-five aircraft." The effect of interdiction on the Axis ability to fight was evident in prisoner of war interrogation.

communication in the final stages of the campaign, it did aid in the location of re-supply efforts, see Bennett, p.215.

148 Ibid.

149 Ibid., pp.185-186.


151 Tedder, p.412.
reports. One prisoner complained that for the last ten days of the campaign "there were only 21 rounds of mortar ammunition".\textsuperscript{152} Moreover, of the 150,000 tons required per month for all troops only 20,000 tons got through.\textsuperscript{153}

The assault by the Eighth Army on Enfidaville met the heavy resistance typical of the German army. The constant attack by the Allied Air Forces had taught it to disperse, and thus few suitable targets could be found for close air support. After failing in their initial attacks, a short pause in the fighting ensued, during which the entire weight of the available NWATAF was directed at Axis shipping. As aircrews became familiar with attacking shipping, this campaign became very effective, and "on the last day of April, not a single enemy ship arrived in port, adding to the enemy supply predicament."\textsuperscript{154}

When the land campaign resumed, it was only a matter of days before all Axis troops in Tunisia surrendered, due as much to a lack of supplies as anything else.\textsuperscript{155} XII ASC was placed under the operational control of 242 Group that had moved to the extreme north of the front with II US Corps. The Axis forces were thus split with "one portion lying between Tunis and Bizerta, the other in the region of the Cap Bon Peninsula."\textsuperscript{156} On 6 May, the attack by First Army, reinforced by 7\textsuperscript{th} Armoured Division, 4\textsuperscript{th} Indian Division, and 201\textsuperscript{st} Guards Brigade from the

\textsuperscript{152} WO 208/4199 Extracts from German and Italian POW Interrogation Reports, extract 8, undated.
\textsuperscript{153} Ibid.
\textsuperscript{154} Tedder, p.414.
\textsuperscript{155} Hinsley, II, pp.611-614.
\textsuperscript{156} Tedder, p.415.
Eighth Army, attacked the Medjez-Tunis area, preceded by a
softening-up of the enemy’s ground forces by “the largest weight of air
attack ever undertaken in support of a ground battle.” So successful
was this aerial attack that the advance met little resistance. Indeed, on
this day

Allied Air Chiefs were then able to prove a long-contemplated theory. For
the first time in any war sheer weight of air attack blasted a path
through heavy enemy positions. The four miles by one thousand
yards ‘carpet’ of bombs laid by the Tactical Air Force prepared a way
for the advance of our armour before Massicault and clearly
demonstrated what air domination [could] achieve. When, as in this
one instance, 2,500 aircraft sorties in one day can be flown with
small loss it [meant] that a way [could] be cleared of any ground
oppositions; it [meant] that an advancing army [could] penetrate the
strongest defences.

Similar attempts against the German army at Caen following the
Normandy landings in the summer of 1944 proved that this notion did not
always work, but in this instance its success was evident. At times, the
ground situation was changing so quickly that close support became
difficult and even perilous to conduct. In such circumstances, close air
support aircraft were redirected against enemy movements behind the
battlefront, demonstrating the skill of Allied air commanders and their
intelligence organizations that kept them informed of the total air and
ground situation.

On 10 May, the enemy in the northern area surrendered, and on 13
May all resistance in Tunisia ceased. The strength of Allied air power,

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187 NARA RG 331 Records of Allied Force Headquarters Box 72 Reel 6-C 18 Army Group,
Operation Instruction No.13, 3 May 1943; AHB, Air Support, p.90.
158 LHCMA, Papers of Major-General McNeill 1/2 A2 pp.10-11.
and a quick move by Allied armour supported by the NWATAF, had convinced the Axis that any attempt at a ‘Dunkirk’ style evacuation would be unsuccessful. The Allies netted over 138,000 German and 110,000 Italian prisoners during the final offensive, along with all their equipment. The Tunisian campaign was over, and as Alexander put it “We are masters of the North African shores.”

The lack of a fully developed close air support doctrine between the wars in both air forces became evident during the initial exploitation of ‘Torch’. Neither army nor air force commanders had any understanding of how to properly use their available tactical air power. Coningham and Tedder brought the doctrine developed in the desert to Tunisia, and although it required army commanders to relinquish their control of aircraft, the result more than made up for the loss. Coningham created a system by which tactical air power could be controlled at the command level that had access to all available intelligence, but only exercised such control in order to direct aircraft where they were most needed. In general, the relationship between, for example, Eighth Army and the WDAF remained in place, but Coningham’s headquarters could redirect aircraft from the WDAF or other formations to areas requiring more air support. In order to be able to do so, intelligence systems were reorganised and integrated as they had been in the Western Desert.

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160 PRO WO 214/11 Most Secret Cipher Message to Prime Minister from Alexander, 13 May 1943.
Thus, very quickly a system was established that made effective use of Allied air power.

Just as the system for controlling aircraft was being improved, so too were the provisions for ensuring that aircraft were supplied, maintained, and able to operate in the forward areas. Moreover, the re-issuing of tactical memoranda from the WDAF, combined with those being issued from the RAF and USAAF units in Tunisia, allowed the aircraft to attack targets more effectively. Thus, the system enabled intelligence to act as a force-multiplier, and the force being multiplied was improving simultaneously. The result was a dramatic increase in the ability of the Allied air forces to deliver close air support or interdiction in response to a specific plan designed by army and air force commanders. Unthinkable before the reorganization in February 1943, aircraft could be switched from one target to another, and aircraft from other areas in the theatre could be focused on close air support without delay. In many instances, close air support proved to be essential to success on the ground. Intelligence was vital to this ability.
Conclusions

The impact of air power at the battlefront was not uniform throughout the campaigns in the Western Desert and Tunisia, nor was its development linear. Initially, even weak close air support achieved significant results against an Italian army that was both operationally passive and largely non-motorized. However, this trend did not continue. Once the German Afrika Korps arrived in the Western Desert the British C^3I system had to be entirely redesigned while the campaign was being fought, and doing so was very difficult. Despite the loss of the RAF’s official doctrine for close air support developed during the First World War, the interwar Air Control experience of Tedder and Coningham served the RAF well. Many of the obstacles were overcome by the middle of 1942, and the result was a dramatic improvement in the RAF’s ability to apply effective close air support. However, the British army was still unable to compete effectively in the mobile arena. The German army continually completed its way through the ‘Boyd’ loop faster than the British, and used their armoured forces more effectively than the British. This resulted in failures on the ground that nullified improvements to the system of close air support, despite the fact that by mid-1942 it was functioning effectively. Consequently, by the time of operation ‘Torch’, the doctrine for close air support developed in the desert had not been absorbed by the rest of the RAF and USAAF, and it mattered little to the initial exploitation of ‘Torch’. However, unlike the case in the Western
Desert, there was a template upon which to draw, and where it had taken the RAF years to develop the doctrine, it was adopted quickly by the Allied air forces.

The RAF and USAAF, two air forces that at the beginning of the war had neither the intention nor the capability to provide close air support, had by the end of the Tunisian campaign developed both the desire and ability to provide such support to a high level, an ability equal to the German forces at their best. After the reorganization of forces in early 1943 and up to the end of the war, close air support had become a vital part of Allied campaign planning, and forward troops were routinely provided with adequate means for calling for such support. This doctrine was based on lessons learned initially in the Western Desert and then transferred to Tunisia during the reorganization of February 1943 in the form of command experience. The command experience gained by both RAF and USAAF officers in the Tunisian campaign governed close air support operations for the rest of the war and beyond. Indeed, some scholars have argued that this doctrine was fundamental to the success of Quesada’s IX Tactical Air Command, and was brought to the USAF Tactical Air Command by William M. Momyer.¹ Both of these men learned a great deal from the Tunisian campaign, Quesada as deputy commander of the Northwest African Coastal Air Force, and Momyer as a

¹ Hallion, op. cit., p.174.
pilot from 12 ASC.² The success of close air support during the
Tunisian campaign following the reorganization of armed forces and
intelligence organizations convinced the rest of the RAF and USAAF that
this doctrine was correct.

It will be recalled that the term ‘doctrine’ refers to more than mere
understanding of a principle. In the context of military affairs, it refers to
the means by which guidelines for military action are established, and
must include realistic training or combat experience to evolve and fine-
tune the theories behind the doctrine. By the end of the Tunisian
campaign, both the RAF and USAAF had a complete ‘doctrinal loop’ for
tactical air power. They had experience that showed them areas of
concern in their doctrine, such as the growing realisation that
fighter/bombers were far more flexible and easier to maintain and operate
than heavy bombers in a close support role, and they had addressed this
issue through the adoption of more fighter/bombers. Moreover,
intelligence personnel had achieved sufficient experience to deal quickly
and effectively with incoming intelligence, and these sources had been
more fully integrated into operational planning. In short, this was not a
doctrine based on theories with no practical experience. The theories had
been thoroughly tested, and solutions found for problems affecting the
application of tactical air power.

² Orange, op. cit., p.137.
In this way, this dissertation has differed from traditional views on the relationship between doctrine and military ability. David Mets has argued that senior USAAF officers understood every tenet of the doctrine developed in the Western Desert in the inter-war period. However, as this dissertation has shown, understanding an idea is far different from translating it into a working doctrine. The close air support system that the Americans brought with them to Tunisia demonstrated that the USAAF had not done so. The system failed to work because no serious and realistic effort had been put into testing the organization and methods of responding to calls for support. Moreover, little thought had been put into the mechanics of delivering planned close air support, something that represented the bulk of Allied air support operations. The doctrine brought to Tunisia by the WDAF was adopted by both the rest of the RAF and by the USAAF, and although modifications were made to the system, the fundamental principles remained at the core of the doctrine of both air forces for the remainder of the war.

This dissertation has also shown that the ability to conduct close air support or interdiction operations improved dramatically with more capable C^3I systems, which allowed the rapid processing and dissemination of target material against a background of often excellent understanding of enemy intentions or capabilities. This dissertation

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demonstrated the way in which strategic intelligence guided the collection of operational intelligence by showing the movement and state of enemy forces. This differs from the traditional view on close air support. For example, some historians have argued that communications were the linchpin to the close air support system, and as far as they go they are correct. Communications enabled the passing of intelligence and orders based on that intelligence, and the more capable the communication system, the more rapidly this could be accomplished. Thus, communications were a vital part of the ability to deliver close air support. But without understanding why this was so, an incomplete picture has been presented. From this standpoint, this dissertation represents an important change in focus.

This work has also illuminated many of the other important aspects of successful operations, including a capable military force equipped with sufficient numbers of the right kind of aircraft, and with the right kind of tactics for the targets they were attacking. Also, the requirement for maintaining, supplying, and moving these aircraft with the flow of battle has been shown. Although some of these aspects are noted in the literature, intelligence historians are often guilty of implying that intelligence by itself was sufficient to ensure victory. But intelligence was a necessary condition to successful tactical air operations, and in many instances those air operations were a necessary condition for victory on

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the battlefield. However, both intelligence and close air support were amongst a number of necessary conditions.

Many historians make no distinction between the theory of air support in Britain and that developed in the desert. But it has been argued here that a doctrine created by men with interwar experience in Air Control operations and wars on the frontier of the British Empire was fundamentally different from that designed in Britain. However, before the important parts of this system reached fruition, the repeated failures on the ground clouded over their true value and prevented them from being adopted by the rest of the RAf. Similarly, the USAAF officer commanding the American contingent attached to Air Headquarters, Western Desert, Major General Brereton, saw the effectiveness of the British close air support and interdiction operations, and recommended that the USAAF adopt them. Again, a lack of recent experience with close air support, the failure to appreciate its potential, and the failures of British forces in the Western Desert prevented this. Consequently, both forces came to Tunisia with an unworkable doctrine where separate air forces fought separate wars, and where Corps commanders had their own personal piece of the tactical air force to call upon at will at the expense of overall efficiency. The failure of this system between November 1942 and January 1943 saw a dramatic reorganization of land and air forces, and intelligence systems along the lines developed in the desert. The success of this system was noted by both air forces, which, near the end
of the Tunisian campaign, sent observers to learn the important aspects of the doctrine for use in later campaigns.

A visit from Air Marshal Sir Trafford Leigh-Mallory, the commanding officer of Fighter Command, in late March 1943 was important to the adoption of this doctrine by the RAF. The purpose of his visit was to study the organization of Allied air forces with the coming cross-channel invasion in mind. Leigh-Mallory was particularly impressed with the liaison between air and ground personnel “where the Military and Air Commanders and staffs [were] working side by side in the closest harmony, and each fully appreciative not only of the importance which air operations have on the land battle, but also of the effect of land action on the successful operation of air forces.” This working relationship was a fundamental piece of the doctrine developed in the desert, and it was an important observation for the future of close air support. Indeed, for the remainder of the war this became, with few exceptions, the foundation for the command relationship between the army and tactical air forces of both the RAF and USAAF.

As might have been expected, Leigh-Mallory noted the importance of having all air force units, regardless of nationality, controlled by an Air officer; these air units could be switched from one Group to another

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6 AIR 20/6130 Report by Air Marshal Sir Trafford Leigh-Mallory on his visit to N. Africa March/April 1943.
7 PRO AIR 37/1067 Minutes of the Allied Air Commanders’ Conference, 14 June 1944.
Montgomery’s relationship with Coningham and Leigh-Mallory was degraded by Leigh-Mallory’s rejection of Montgomery’s plan to capture Caen with airborne forces.
depending on the military situation. Indeed, this became a standard practice in the Allied Expeditionary Air Force (AEAF) that provided close air support for the invasion of France in 1944. During the German offensive of late 1944, which became known as the Battle of the Bulge, Coningham placed his fighter/bombers under the control of USAAF Brigadier General Quesada, the commanding officer of IX Tactical Air Command, to aid in the close support of the American forces. Quesada later recalled that this action by Coningham “helped tremendously.”

Leigh-Mallory also noted the importance of reconnaissance, and felt it was essential that a reconnaissance wing be attached to each Composite Group. This was due to the vast majority of air operations being arranged “as part of a pre-arranged plan worked out some time in advance”, and therefore good intelligence was essential to making use of the flexibility of air power. It was only occasional fighter/bomber operations that were not part of the pre-arranged plan, and only occurred when intelligence located a particularly favourable fleeting target.

Aside from interest in the command organization, Leigh-Mallory was also taken with the NWATAF’s method of controlling aircraft on operations. In response to intelligence, Coningham at NWATAF headquarters issued general directives to his Group commanders, but left

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8 Hughes, op. cit., pp.281-282.
9 AIR 20/6130 Report by Air Marshal Sir Trafford Leigh-Mallory on his visit to N. Africa March/April 1943. A Composite Group consisted of fighters, fighter/bombers, bombers of various types, and reconnaissance aircraft.
10 Ibid.
11 Ibid.
it up to them to carry out his orders. Group commanders created an air plan, and the actual control of the aircraft in response to this plan was through the fighter control centre. Since arranging fighter escort for bomber and fighter/bomber missions was often critical to their success, controlling all aircraft from the fighter control centre was the easiest way to accomplish this. This method of control was adopted directly from the WDAF, where it had proven successful.

The interest of several USAAF officers was instrumental in ensuring the adoption of this doctrine by their air force. The interest began in 1942 with the attachment of a USAAF contingent to the WDAF. The commanding officer of this contingent, Major-General Brereton, sent summaries of the Desert Air Force’s method of control. More important was the way in which Coningham impressed Brigadier General Howard Craig, the Chief of Staff of the Mediterranean Air Command. Craig was very impressed with Coningham’s ideas, and circulated them amongst his own air force. This was enhanced by a visit by three USAAF officers to the North African theatre in April 1943, where Brigadier General Kuter explained the doctrine to them in detail. They brought back information on the control of air forces, and methods for executing the missions. This

12 LC, Quesada Papers, May 1975 Interview section 2, p.30. Quesada commented that Coningham was very good at integrating intelligence from a variety of sources into his operational planning.
13 AIR 20/6130 Report by Air Marshal Sir Trafford Leigh-Mallory on his visit to N. Africa March/April 1943.
15 LC, Spaatz Papers I: Box 9, Letter from Craig to Spaatz, 23 December 1942.
provided the spark for a restructuring of American close air support
discipline. A similar situation occurred with the RAF, which, as a result of
Leigh-Mallory’s report, reorganized and renamed the British Army
Cooperation Command 2nd Tactical Air Force, with Coningham’s NWATAF
being the first.18

However, the command and control system that Leigh-Mallory
designed for use during ‘Overlord’ was cumbersome and not suited to the
purpose of providing rapid air support to ground formations. The AEAF
comprised Coningham’s 2nd Tactical Air Force, Brereton’s 9th US Air
Force, and Roderic Hill’s Fighter Command (renamed Air Defence of Great
Britain).17 Until Leigh-Mallory could establish himself on the continent,
Coningham wore two different hats; the first being that of the head of 2nd
Tactical Air Force, and the second that of commanding the advanced
section of AEAF.18 From his headquarters in Uxbridge, Coningham was to
coordinate the planning and operations of both tactical air forces, and had
“the necessary executive authority to implement all requests for air action
required by the Army”.19 These needs were met through a Combined
Control Centre, which issued his instructions. Leigh-Mallory was merely
to “exercise general direction of air operations”.20

18 Orange, op. cit., p.150.
17 Ibid., p.181.
18 PRO AIR 37/1213 Allied Expeditionary Air Force. Note on Planning and Preparation of NW
France by personal Secretary to Sir Trafford Leigh-Mallory, 1944.
19 Ibid.
20 Ibid.
Leigh-Mallory’s position was thus seen as an unnecessary command level, one which Coningham and Brereton bypassed when inconvenient. The situation had changed from that of operation ‘Torch’, where airmen needed a central controlling headquarters with access to all intelligence, as the British and Americans were initially fighting separate wars. Coningham and Brereton were two commanders on the distribution list for Ultra intelligence, and their personal relationships enabled them to cooperate with each other without the direction of a higher command level. Near the end of March 1944, in response to questions by Eisenhower, Quesada explained that the cooperation between the USAAF 9th Air Force and the 2nd Tactical Air Force was so close that it was a simple matter to arrange additional support. Indeed, this was precisely what happened when Coningham gave control of his fighter/bombers to Quesada during the Battle of the Bulge.

This demonstrates the point that C^3I systems have to be tailored to the conditions of the theatre. In Tunisia, the central NWATAF headquarters was essential to the flexible exercise of air power, without which operations were diffuse and ineffective. In Northwest Europe, however, although the need for close relationships between air and ground commanders was essential to effective support, a central controlling headquarters was in this instance a drawback. AEAF headquarters provided neither intelligence not in possession of lower

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21 Brereton, op. cit., pp.254-255.
command levels, nor a means by which the two air forces could be directed in a more productive manner. Consequently, at midnight on 14 October 1944, AEAF headquarters ceased to exist.\textsuperscript{22} The provision of close air support and interdiction proceeded as normal. Both air forces used the doctrine developed in the Western Desert and Tunisia.

In response to the lessons learned during the Tunisian campaign, and the visit by observers to the theatre, General Marshall ordered a new manual on the command and employment of air power. A committee was set up including Col. Martin McKinnon, the Commandant of the Air Support Department of the School of Applied Tactics, Col. Ralph Stearley, the Commander of the I Air Support Command, and Lieut. Col. Orin Moore, Armoured Forces liaison officer at USAAF headquarters.\textsuperscript{23} The manual outlined many of the key points in the doctrine developed in the Western Desert. Added to this was the practical experience gained by intelligence officers, pilots, and those commanding tactical air forces. Combined, this represented a complete ‘doctrinal loop’.

In July 1943, the USAAF published its field manual FM 100-20, and at the same time the Air Ministry and War Office issued their Training Instruction No.1, which was very similar to the American doctrinal manual.\textsuperscript{24} From air forces so opposed to even the idea of close air support

\textsuperscript{22} PRO AIR 8/1181 Allied Expeditionary Forces: Reorganization, 1944.
\textsuperscript{23} Cooling, Case Studies in the Development of Close Air Support, op. cit., p.184.
\textsuperscript{24} NARA RG 337 Entry 55 Box 970, Field Manual 100-20, July 1943; NARA RG 331 Entry 272 Box 1, Mediterranean Allied Air Force Headquarters, Army Air Training Instruction No.1, July 1943.
prior to the war, a revolution in thinking had occurred. Both doctrinal manuals emphasised the equal but interdependent relationship of armies and air forces. Air forces assisted armies through the attainment and maintenance of air superiority that allowed “freedom of action for land forces and supporting air forces.” However, air forces were dependent upon armies to capture and construct forward airfields, to ensure their security, and to provide daily requirements of fuel, food, spare parts, and other essential requirements. Thus, the interrelated nature of ground and tactical air operations was finally spelled out in official doctrine, and reflected the reality of the day-to-day operations in Tunisia.

Both manuals held “that the inherent flexibility of air power [was] its greatest asset.” This flexibility could only be adequately exploited if its control was exercised through the air force commander with access to all available intelligence. He would be able to “employ the whole weight of the available air power against selected areas in turn: such concentrated use of the air striking force [was] a battle winning factor of the first importance.” This important realization was less a declaration of independence, as some scholars have alleged, and more an acknowledgement of reality as learned in combat. Placing air units

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25 RG 331 Entry 272 Box 1, Mediterranean Allied Air Force Headquarters, Army Air Training Instruction No.1, July 1943, p.1.
26 Ibid.
27 NARA RG 337 Entry 55 Box 970, Field Manual 100-20, p.1, RG 331 Entry 272 Box 1, Mediterranean Allied Air Force Headquarters, Army Air Training Instruction No.1, July 1943, p.4.
28 NARA RG 337 Entry 55 Box 970, Field Manual 100-20, p.2.
under the command of army formations prevented their concentration against vulnerable targets. Such air units were instead used in a diffuse and largely ineffective manner, inflicting little damage on enemy land or air forces. The Tunisian campaign had shown the value of concentrating overwhelming air power at the point of attack. In particular, close air support attacks in the form of co-ordinated bomber and fighter-bomber attacks, in softening resistance before the break-through, and later in support of our armoured forces, was yet another example of how air power [could] blast the way for advancing land forces.\[^{30}\]

After the Tunisian campaign it was considered standard practice for both the RAF and USAAF to have a tactical air force attached as an equal partner in "a theater of operations where ground forces [were] operating."\[^{31}\] The control of available air power must be centralized and command must be exercised through the air force commander if this inherent flexibility and ability to deliver a decisive blow [was] to be fully exploited. The superior commander will not attach army air force units to units of the ground forces under his command except when such ground force units [were] operating independently or [were] isolated by distance or lack of communication.\[^{32}\]

Thus, both forces officially discarded the belief, common amongst Corps commanders during the initial stages of the Tunisian campaign, that air

\[^{100-20}\] dealt more with organization and control of air forces and less with the practicalities of delivering close air support. However, Army/Air Training Instruction No.1 discussed practical methods for the employment of various types of aircraft in various roles. Also, as this work has shown, organization and control are of critical importance to the success of close air support operations, and the significant practical experience gained by personnel in Tunisia provided the practicalities of delivering close air support.

\[^{30}\] Ibid., p.12.
\[^{31}\] NARA RG 337 Entry 55 Box 970, Field Manual 100-20, July 1943, p.10.
\[^{32}\] Ibid., p.2.
forces were theirs to command. There would be instances where air units would be closely associated with ground formations, such as the WDAF and Eighth Army, but ground commanders could no longer count on this arrangement. Instead, air power could be used against the most profitable of a variety of targets within range of the aircraft responding.

The missions of the tactical air force ranged from the attainment of air superiority, to interdiction, and finally to close air support. Controlling all available air forces under an air force commander who had access to available intelligence enabling him to direct the air power against the best of the choice of targets allowed for the best use of air power. Thus, the assignment of third priority to close air support did not tell the entire story. Rather, it was more important that the USAAF had, like the RAF, improved its ability to gather and respond to incoming intelligence, and could thus use its available air power where appropriate. The fact that close air support ranked third in listed priorities represented more an understanding that it was only called for when armies were attacking or being attacked, and that "separate air operations normally preceded surface operations", rather than a dismissal of the value of close air support. However, it was acknowledged that operations where troops were closely engaged were the most difficult to control, and were only

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33 NARA RG 337 Entry 55 Box 970, Review of FM 100-20 (Advance Copy) July 1943. Dr. Ian Gooderson, in his book Air Power at the Battlefront, (London: Frank Cass, 1998), p.51, incorrectly focuses on the low ranking given to close air support as being a dismissal of its value rather than an acknowledgment of the infrequency of the need for it in relation to the continuous attack on supply columns and enemy aircraft.
profitable at critical times. Indeed, even Luftwaffe doctrine held that close air support against enemy forces in a good tactical position "as a rule [was] unlikely to produce results commensurate with the effort expended, although such action might be required in special circumstances." In such circumstances good intelligence was even more vital to success, as the risk of striking friendly forces due to errors in target designation or navigation was greater.

The USAAF tactical air commands, as the air support commands became known, developed different procedures and structures for the prosecution of air support missions, but these systems were broadly similar. It was not until August 1946, when FM 31-35 was re-issued, that these systems would be standardized. However, this did not interfere with the ability of these tactical air commands to provide swift, cost-effective close air support and interdiction. Although using different terminology, the American air support system was very similar to the British. The close association of ground and air forces at Corps and Divisional levels was assured by the attachment of Tactical Air Party Officers to these headquarters to receive and transmit requests for support. Ground Liaison Officers, provided by the army, were attached to all air headquarters down to the Group, as well as to photographic and

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35 NARA RG 337 Entry 55 Box 970, Field Manual 100-20, July 1943, p.13.
tactical reconnaissance squadrons. This new system was inaugurated in November 1943 in VIII Air Support Command, "at which time selected air officers were attached to the Corps and Divisions then in training in the United Kingdom." During this training, numerous exercises were held in which requests for air support were passed from division to Corps for evaluation, and suitable requests were then forwarded to Tactical Air Command headquarters for final approval and execution. This basic procedure was employed virtually unchanged throughout the European campaign.

At the end of the Tunisian campaign there was sufficient evidence that this doctrine worked. That, coupled with the desire of USAAF officers to be seen as equal partners, ensured that it received a wide audience. General Arnold moved to ensure this by ordering that every officer in the Air Forces be given a copy of the new manual "to read and study." Even before the manual was issued, its teachings were put into the curriculum of the Infantry School at Fort Benning. The speed with which this doctrine was adopted caused some controversy. In particular, it was adopted by the War Department without the consultation or approval of the commander of the Army Ground Forces, Lt. Gen. Lesley

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38 Ibid.
39 Ibid.
41 Hallion, op. cit., p.174.
McNair, who would later be killed by American heavy bombers operating in close support.\textsuperscript{42} However, the way in which it was instituted did not represent an irreconcilable schism between land and air forces.

For example, while commander of IX Tactical Air Command, Quesada developed the Armoured Column Cover to provide armoured spearheads with instantaneous close air support. To deliver support when requested, a flight of four P-47 Thunderbolts operated over the tank column, and communicated by wireless with ground controllers in the lead tanks. The flights were relieved every thirty minutes, and if no support targets were present, they were frequently used to search the road ahead for German troops, guns, or tanks.\textsuperscript{43} While not the most cost-effective use of air power, this type of operation proved extremely effective during the COBRA offensive, the American breakout from the Normandy area at the end of July 1944, and represented the degree to which air force officers were willing to work with the army to provide better support.\textsuperscript{44}

In addition to adopting the system of control of tactical air power, the American armed forces also adopted methods of gathering and integrating intelligence. Indeed, this was fundamental to being able to control tactical air power, and the command arrangements made it possible to receive and act upon incoming intelligence. The Americans

\textsuperscript{42} Ibid.; Hughes, op. cit., p.215.
\textsuperscript{43} PRO AIR 40/1131 General Bradley and the U.S. 12 Army Group Air Effects Committee, Effects of Air Power on Military Operations, Western Europe, Wiesbaden, German: U.S. 12 Army Group Air Branches, G-3 and G-2, 15 July 1945, pp.41-42.
had learned the value of signals intelligence in the Tunisian campaign, and had adopted British methods for exploiting it. They had learned the value of prisoner of war interrogation, and by 1945 felt it was “the best measure of the effectiveness of air attack.” Experience in the Tunisian campaign also showed that this source provided “an abundant source of information respecting the effectiveness of air plans, tactics, techniques of attack, and the various weapons employed.” They also adopted the British system of photographic interpretation and aerial reconnaissance.

In 1943, Brigadier General L. Kuter had argued that the ineffectiveness of observation groups should be accepted as proved in this theatre and maximum effort should be made to elevate the position of our present observation aviation to a much higher level by the immediate formation of truly proficient tactical and strategical reconnaissance squadrons.

These reconnaissance squadrons, he further recommended, should be equipped with high performance aircraft, and their crews should receive special training. Immediately following the German surrender in May of 1943, Kuter, Lt. Col. John Dyas (commander of the 154th Observation Squadron), and Lt. Col. E.S. Biden (a South African Air Force staff officer with experience in the Western Desert and Tunisia) were invited to the United States to discuss the subject. Dyas and Biden were sent to the Army Air Force Board at Orlando, Florida, where a reconnaissance sub-

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47 Ibid.
48 LC, Spaatz Papers I: Box 12, Organization of American Air Forces, 12 May 1943.
49 Ibid.
board had been established under the command of Colonel Minton W. Kaye on 9 June 1943. This board was directed to determine the place of visual and photographic reconnaissance in the USAAF. It adopted the British division of all reconnaissance into either strategic or tactical reconnaissance. The tactical reconnaissance group was to comprise a headquarters, one photographic reconnaissance squadron, one long-range tactical reconnaissance squadron per army, and one short-range tactical squadron per corps and one in reserve. Procedures for disseminating intelligence were similar to those developed in the Western Desert by the RAF. The tactical photographic reconnaissance group had one photographic squadron, and a technical section that was to produce aerial photographs for targeting and bomb damage assessments. This reconnaissance program was approved by General Arnold on 9 October 1943, and was incorporated into the USAAF plans. In March 1945, the commander of First US Army, Lt. Gen. Courtney H. Hodges, wrote that the existing procedure for tactical and photographic reconnaissance had resulted from long combat association of First Army and IX Tactical Air Command and was "an eminently satisfactory one... The several Corps which have served with First Army have expressed complete satisfaction with the results achieved."
The procedures for the collection and quick dissemination of photographic intelligence were identical to those developed in the Western Desert. First phase reports, which dealt with a few “important bits of intelligence upon which an operation may be waiting”, were passed swiftly along to those who could use them since “SPEED [was] their essence.” This was considered vitally important to tactical air force operations, which required “pictures of their targets plus quick, frequent BDA [bomb damage assessment].” Despite initial opposition to the entire program by ground force commanders, most found the results completely satisfactory. Indeed, with few exceptions, ground force commanders were eminently pleased with the provision of close air support. No system is ever perfect, or completely successful, but both the RAF and USAAF had evolved close air support to a high level. It did not survive long after the war.

The dropping of atomic weapons on Hiroshima and Nagasaki by USAAF bombers in August 1945 significantly altered how air power was viewed. The bomber barons assumed that their ideas about the efficacy of the bomber had finally been proven, although the lack of nuclear weapons for years after the war contradicted this view. However, as the world moved into the Cold War, the idea of tactical air power faded from practice in many of the world’s air forces that had spent so much effort in

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56 Ibid., p.4.
re-learning how to conduct tactical air operations. Although the
forms remained in place, much of the substance was lost.

The RAF Operations manual issued in 1957 dealt at great length
with intelligence and tactical air power, and many of the principles
developed in the Western Desert were still considered fundamental to the
exercise of tactical air power. The tactical air force was organized as part
of a theatre air force. All aircraft used in tactical operations were thus
kept together operationally, something that was a reality from the earliest
stages of the desert campaigns. In the early stages of the desert war, the
lack of aircraft made this the only feasible way to control aircraft, but it
was soon realized that it was the best way to make use of the flexibility
of air power. The co-equal status of land and air forces was again
stressed, and that every operational plan "must be a joint land/air plan
throughout all stages of its formulation and execution." The command
of the air assets was to be centralized, and the lowest level at which
command was normally exercised was at the tactical group/army level.

Headquarters were to be adjacent to army formations to ensure both
services kept each other in the military picture. Moreover, the manual
described air reconnaissance as "the most valuable single source of
information in modern war...It is indispensable to the effective conduct of
all operations and is obtained by visual, photographic, and electronic

58 Ibid.
59 Ibid.
means.”® It was, therefore, “a vitally important function of a tactical air force”.® As discovered in the Western Desert, the attainment of air superiority was to be the chief role of the tactical air force, followed by interdiction operations and close air support.

Although the Second World War forever altered how both the RAF and USAF controlled tactical air power, it is equally true that much of the other important parts of the ‘doctrinal loop’ were lost in the years following the Second World War. The experience in the Korean War confirmed this lack of a tactical doctrine amongst the USAF.® In the Vietnam War, army officers were displeased with early attempts to provide close air support. In particular, the processing “of requests through Army command channels [was] time consuming, and the delay in informing the Air Force of the air-support requirement [was] excessive.”® Moreover, the lack “of reliable communications, especially for the air request system and the forward air control system” was noted.® The theory behind how close air support was to be delivered was very similar to that developed during the Second World War. The Direct Air Support Centre (DASC) was the Air Force facility located close to the Army’s Tactical Operations Centre (TOC). The centre was staffed with fighter and reconnaissance duty officers, and intelligence officers. Planned

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® o Ibid., p.25.
® ' Ibid., p.33 and p.66.
® ® Hughes, op. cit., p.305.
® ® Ibid.
requests for close air support were submitted through Army command channels to reach the TOC at the Army Forces Command Post by a specified hour. The TOC then evaluated, assigned priorities, and forwarded the requests to the TACC for planning and execution. Impromptu requests were passed through the Air Force air request net direct to the DASC. Immediate Tactical Air Control Parties would monitor the net and acknowledge receipt of the subordinate unit’s request. After acknowledgement, silence signified Army approval. If an Army unit disapproved a subordinate unit’s request, the attached TACP would transmit disapproval direct to the DASC. However, insufficient practical experience had left the USAF unready to provide rapid, reliable support. Recent combat experience has required the re-establishment of close air support doctrine in both the RAF and USAF.

The current understanding of the air-land battle, a term used by both the RAF and USAF, shares much with that learned in North Africa. The first priority for tactical air forces is the attainment and maintenance of air superiority. Controlling the air environment “gives commanders the freedom to conduct successful attacks which can neutralize or destroy an enemy’s warfighting potential.” Without this control, “tactical flexibility is lost.” However, where ground force officers have tended to stress

67 Ibid.
the importance of close air support alone, the current US Army doctrine states that “Air forces must attack not only those enemy forces in contact, but enemy forces held in reserve or rear echelons as well.”®® While understanding that in certain circumstances close air support will be essential to victory on the ground, attacking targets behind the lines had a direct impact on the battle by denying the enemy “the time and space to employ forces effectively.”®® Thus, tactical air operations are part of a definite plan between air and ground commanders, and through close association ground forces can exploit the impact of air operations. The requirements for successful tactical air operations are the same as they were during the Second World War. Efficient C³I is an essential element.

Intelligence is also acknowledged as a fundamental requirement for the successful conduct of tactical air operations. Both air and ground commanders need to know where the enemy is deployed, what he plans to do, how he will do it, and what the options are. Signals intelligence can provide much of that information, thus focusing other intelligence gathering efforts, but of equal importance is reconnaissance.®® The need for speed of intelligence gathering, processing, and dissemination, and in the reaction to that intelligence, is as great today as it ever was. And although technology has provided means by which armed forces can keep pace with a changing situation, the same technology has increased the

®® Ibid.
®® Ibid.
amount of information to a point that threatens to paralyse the whole system. Thus, the speed of reaction depends, as it always has, on the nature of the C^3I system. This is particularly true of air power, whose costly resources are usually under-provided and must therefore be used in the most economical fashion.71 Just as in the Western Desert and Tunisia, using these resources to greatest effect requires that they be controlled at a sufficiently high formation with access to all the available intelligence.72 This is repeated in a current RAF manual that quotes Lord Tedder as having said, “Air warfare cannot be separated into little packets; it knows no boundaries on land and sea other than those imposed by the radius of action of the aircraft; it is a unity and demands unity of command.”73 Similarly, General H. Arnold is quoted as saying the “greatest lesson of this war has been the extent to which air, land and sea operations can and must be co-ordinated by joint planning and unified command”.74 Equally important are systems that can survive in combat to receive intelligence and control aircraft in a timely fashion in response to it.75 This “is a tall order, but is the key to the successful use of air power in the future.”76 One of the fundamentally important factors, as always, is intelligence.

71 Ibid., p.165.
72 Ibid.
73 Air Ministry, Air Publication 3000, (London: HMSO, 1999), section 1.3.1.
74 Ibid.
75 Ibid.
76 Garden, p.165.
### Abbreviations Used

<table>
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<tr>
<th>Abbreviation</th>
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<tr>
<td>AA</td>
<td>Anti-aircraft</td>
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<tr>
<td>AAFSAT</td>
<td>Army Air Force School of Applied Tactics</td>
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<td>AAFTAC</td>
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<td>AAPIU</td>
<td>Army Air Photographic Interpretation Unit</td>
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<td>Allied Force Headquarters</td>
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<td>Air Historical Branch</td>
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<td>Air War Planning Department</td>
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<td>Brigadier General Staff</td>
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<td>British Troops in Egypt</td>
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<td>CAS</td>
<td>Chief of the Air Staff</td>
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<td>C³I</td>
<td>Command, Control, Communications, and Intelligence</td>
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<td>CGSS</td>
<td>Command and General Staff School</td>
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<td>CIGS</td>
<td>Chief of the Imperial General Staff</td>
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<td>CSDIC</td>
<td>Combined Services Detailed Intelligence Centre</td>
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<td>Centre Task Force</td>
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<td>General Staff Intelligence</td>
</tr>
<tr>
<td>GSO</td>
<td>General Staff Officer (followed by a number that indicated the grade)</td>
</tr>
<tr>
<td>HF</td>
<td>High Frequency</td>
</tr>
<tr>
<td>HQ</td>
<td>Headquarters</td>
</tr>
<tr>
<td>IO</td>
<td>Intelligence Officer</td>
</tr>
<tr>
<td>IWM</td>
<td>Imperial War Museum, London</td>
</tr>
<tr>
<td>'J'</td>
<td>Staff Information Service</td>
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<td>JRUML</td>
<td>John Rylands University of Manchester Library</td>
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<tr>
<td>kc/s</td>
<td>kilocycles</td>
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</table>
LC Library of Congress, Washington D.C.
LHCMA Liddell Hart Centre for Military Archives, King’s College London
LO Liaison Officer
LRDG Long Range Desert Group
MAC Mediterranean Air Command
MEIU Middle East Interpretation Unit
MG Machinegun
M.T. Motorised Transport
NACIU North African Central Interpretation Unit
NAM National Army Museum, London
NAPRW Northwest African Photographic Reconnaissance Wing
NARA National Archives and Record Administration, College Park, Maryland
NCO Non-Commissioned Officer
NWAAF Northwest African Air Force
NWACAF Northwest African Coastal Air Force
NWASAF Northwest African Strategic Air Force
NWATAF Northwest African Tactical Air Force
OC Officer Commanding
OODA Observe Orient Decide Act
OSS Office of Strategic Services
Ph/R Photographic Reconnaissance
PRO Public Record Office, Kew, Surrey
PRU Photographic Reconnaissance Unit
PW Prisoner of War
PWIS Prisoner of War Interrogation Section
RAF Royal Air Force
RAFM Royal Air Force Museum, Hendon
RDF Radio Direction Finding – an early name for radar
RG Record Group
R/T Radio Telephony
SAAF South African Air Force
SIO Senior Intelligence Officer
SLU Special Liaison Unit
SCU Special Communications Unit
Tac Tactical
Tac/R Tactical Reconnaissance
USAAC United States Army Air Corps
USAAF United States Army Air Force
USAAS United States Army Air Service
VHF Very High Frequency
WDCAF Western Desert Air Force
W/T Wireless Telegraphy
WTF Western Task Force
WU Wireless interception unit
‘X’ Intelligence gained from listening and recording prisoner’s conversations
‘Y’ Interception and analysis of enemy low-grade radio transmissions
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