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Evolution in Action:

The Royal Flying Corps/Royal Air Force

And the Development of Ground Attack in World War I

by

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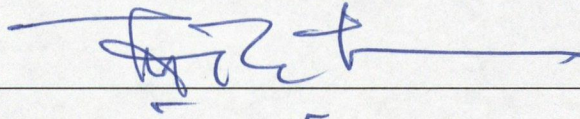
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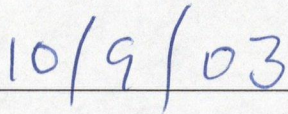
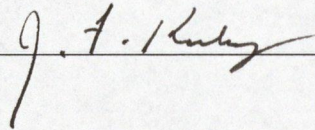
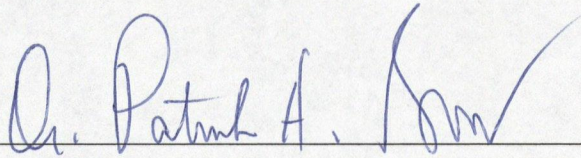
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UNIVERSITY OF CALGARY
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Evolution in Action: The Royal Flying Corps/Royal Air Force And the Development of Ground Attack in World War I" submitted by Adam Garth Pye in partial fulfilment of the requirements of the degree of Master of Arts.



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Date

Abstract

This thesis examines air-to-ground combat by the British air services during World War I. It examines ground attack for the entire war, with the most detailed examination reserved for the 1918 German spring offensives, when air service commanders were forced to dedicate substantial resources to ground attack, thus removing the restrictions of theory and doctrine from air service actions. Ground attack developed from several antecedents, including reconnaissance, long-range bombing and contact patrols. It traces the development of ground attack from individual initiatives in 1914 and 1915, to the semi-organized “trench strafing” missions of 1916 and 1917, to the training and organization of Cambrai, to the 1918 German spring offensives, and finally to the organized Allied efforts of the summer and fall of 1918. Finally, the development of ground attack was evolutionary in nature, and, while important, not as effective as it might have been.

Acknowledgements

This thesis could not have been completed without support from several individuals. My advisor, Dr. Tim Travers, kept me from rampaging unchecked into many strange tangents. My wife, Nadine, kept me clothed, fed, and kept the baby out of my hair: three things without which any writing project would be impossible. Finally, Alexa, my daughter, kept escaping her mother's clutches just enough to remind me that there are many things more important than researching dusty old documents and books. For this I am grateful.

Dedication

To my mother, Denice: when so many people say “you can’t do that” or “why are you doing that?” her response has always been “yes you can” and “why not?” She has always been, in so many ways, my best friend.

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Introduction:
Evolutionary Thoughts:
Ground Attack and British Air Services
In the Great War

Though unknown at the time, on December 17, 1903, the face of warfare changed. With the first powered flight by the Wright brothers, a new dimension was opened for human use, both peaceful and combative. Of course, like every other invention in the history of mankind, if it *could* be used for war, it *would* be used for war. In this case, flight not only opened new possibilities, it closed off others. Cavalry became less relevant for reconnaissance. Surprise, which was a key facet in any nation's war plans, was now difficult to achieve. Air power, which grew from a negligible number of reconnaissance aircraft in 1914, to fleets of combat fighters, observation aircraft, and long-range bombers in 1918, had arrived.

This thesis intends to examine the ground attack aspect of the air war. This examination, which will focus on the period of the German spring offensives of 1918, will also expand to look at the rest of the war, in greater or lesser detail depending upon the period, and will also attempt to determine the efficacy of ground attack throughout the war. In many ways, the method of analysis depends upon the period being examined. Hence, for the purpose of this thesis, the war will be divided into four periods: pre-war to mid-1917, covered by chapter one; the battle of Cambrai, November 1917, examined in chapter two; the German spring offensives, examined in chapter three; and finally, the British offensives of the summer and fall of 1918, examined in chapter four.

Though the reasons for this division will become obvious as the examination goes on, a brief overview of these periods will now be given. Basically, as far as air-to-ground

combat goes, the development of this facet of aerial combat had four distinct phases, which largely matched the time periods given above. In the first phase, what can be called the haphazard phase, ground attacks were of an individual and sporadic nature. There was little if any planning or forethought involved in these attacks; they were nuisance attacks, and little more. In the second stage, the 1917 Cambrai stage, attacks became more developed. While air support for the Cambrai battle was deliberately assigned to specific functions, and the squadrons so assigned received some training in those functions, such a coordinated attack had never been attempted before. The true test, of course, was combat, and many harsh lessons were available to be learned during Cambrai. Whether they *were* learned is another question.

The third and major phase of this paper is the German 1918 spring offensive phase. Desperation will be the key theme of this chapter, as many of the underlying themes and ideas that will be shown to constrain British ground attack options were left behind due to pressure caused by the German successes. Unfortunately, it will be shown that these themes and ideas will be picked up again during the last phase of the war, during the Allied 1918 offensives. This final phase could be considered the “more things change, the more they stay the same” phase, as British ground attack was coordinated in this phase in new ways. However, many of the problems that plagued the air services in earlier stages of the war continued to plague them during this final period as well.

Indeed, as the title of this thesis suggests, the major theme of this examination will be evolution, not revolution. This will be shown, like biological evolution, to have both its advantages and disadvantages. On the plus side of the ledger, with an evolutionary approach, changes that were made usually survived the test of battle before

they were incorporated on a large scale. On the negative side, change came slowly, when it came at all, and many ideas that should not have lasted as long as they did carried weight and cost lives long after they should have been abandoned.

Of these negative ideas, the two most important, and reoccurring, are the concepts of “moral effect” and “relentless and incessant offensive.” These concepts were related, and lasted throughout the war. What the first meant was that moral damage was as important to the war effort, if not more so, than physical damage. This, as we shall see, was a severe handicap to the thinking of the British air services, as it allowed planners to ignore the fact that many of their plans were not working. While moral effect cannot be discounted as an important part of war, moral damage is usually cumulative with material damage; yet British policy thinkers emphasized moral damage at the *expense* of physical damage, and then wondered why German morale was not as bad as it was supposed to be. In many ways, this emphasis on moral effect matched the policy of the British Expeditionary Force (BEF) under Douglas Haig, as well; his costly offensives were often justified on the basis of how much damage they had done to German morale.

The second concept of the all-out offensive had tangible negative effects throughout the war, as well. It was a military maxim in World War I that attacking was more costly than defending; this certainly applied to air combat over the Western Front. When the British air policy of always fighting over the German side of the lines was combined with the German defensive policy of “letting the customer into the store,” plus the effect of the prevailing westerly winds, it is little wonder that the Royal Flying Corps (RFC), the Royal Naval Air Service (RNAS- the naval aviation wing) and, after April 1,

1918, the Royal Air Force (RAF), which the two services were combined into, suffered far more severe casualties than the German air service did.

This thesis will show that these concepts not only had negative effects in general, but that they also had specific negative consequences for British ground attack efforts. As well, it will be shown that in many ways the actions of the British air services in a ground attack role were very effective, and were certainly not the waste of resources that at least one author has stated they were.¹ However, it will also be shown that, due both to the reoccurring themes mentioned above, as well as other reasons, British ground attack efforts were not all they could have been. Overall, the effectiveness of the British air services in ground attack actions will be shown to be a mixed bag, just as the British war effort was as a whole.

Few published works examine ground attack. Of those few that do, they have been largely used for the primary sources *they* examine, and not for their own analysis. Of these works, the most important is the official history of the World War I air war, *The War in the Air*.² This collection, co-written by Walter Raleigh and H. A. Jones, consists of six volumes, as well as a separate volume of appendices, and contains an the most extensive published collection of primary documents on the World War I air war. While *The War in the Air* certainly examines low work in some detail, especially from the battle of Cambrai on, the official history does little to judge the effectiveness of low work. Regarding ground attack during the battle of Cambrai, *The War in the Air* states “Exactly

¹ Divine, David. *The Broken Wing: a Study in the British Exercise of Air Power*. London: Hutchinson, 1966. Pp. 140-143.

² Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-].

what effect on the battle their intervention had had it is impossible to say, but there is some evidence that it was important.”³ Of the German 1918 spring offensives, the official history states that ground attacks were of “importance.”⁴ While this indicates a generally positive view towards the effect of ground attack, there is little analysis to back up that view in the official history. Of the other secondary sources referenced in this thesis, they are used mostly for their anecdotal evidence. While many sources are examined in limited quantities, the best and most extensively used are *Tumult in the Clouds*⁵ by Peter Hart and Nigel Steel, and *The First Air War*⁶ by Lee Kennett. Also of interest is *Canadian Airmen and the First World War*,⁷ by Sydney Wise. While all of these works are useful, none examine ground attack in detail, as this thesis proposes to do.

If secondary works that examine World War I ground attack operations are sparse, fortunately published memoirs, many of which include at least some sort of “low work”, as pilots at the time called it, are common. Of these, the best and most extensively used are *No Parachute*⁸ by Arthur Lee, which deals extensively with the battle of Cambrai, 1917, and *Flying Minnows*⁹ by Vivian Voss, a Bristol Fighter pilot who experienced the German 1918 spring offensives first-hand. Also of interest is *Flying*

³ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. P. 252.

⁴ *Ibid.* P. 363.

⁵ Steel, Nigel and Hart, Peter. *Tumult in the Clouds: The British Experience of the War in the Air, 1914-1918*. London: Hodder and Stoughton, 1997.

⁶ Kennett, Lee. *The First Air War, 1914-1918*. New York: Free Press, 1991.

⁷ Wise, S. F. *Canadian Airmen and the First World War*. Toronto: University of Toronto Press, 1980.

⁸ Lee, Arthur Stanley Gould. *No Parachute: a Fighter Pilot in World War I/ Letters written in 1917 by A.S.G. Lee*. New York and Evanston: Harper & Row, 1968.

⁹ Voss, Vivian. *Flying Minnows: Memoirs of a World War One Fighter Pilot, From Training in Canada to the Front Line, 1917-1918*. London : Arms and Armour Press ; New York : Hippocrene Books, 1977.

*Corps Headquarters*¹⁰ by Maurice Baring, who was General Trenchard's aide for most of the war.

Of course, much of this thesis is based upon primary, unpublished documents. While these have been taken from a variety of sources, including The University of Calgary, The Imperial War Museum, London, and the Royal Air Force Museum, Hendon, by far the greatest amount of research was performed at the Public Records Office, Kew Gardens. The documents available in the Air 1 collection proved especially useful.

¹⁰ Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930.

Chapter 1:
The Interconnectedness of All Things:
The Royal Flying Corps and the
Evolution of Ground Attack before Cambrai

[The Royal Flying Corps'] first duty was reconnaissance. All its other and later uses were consequences of this central purpose, and were forced on it by the hard logic of events.¹¹

War in the Air. Volume I.

A new development was the use of single-seater fighters for low bombing... it may be assumed that the idea was adopted in a hurry.¹²

War in the Air. Volume IV.

Receiving blows from above no doubt generates a feeling of depression.¹³

H. W. L. Modebeck,
Late-19th century
German aeronautical expert.

By November 11, 1918, the Royal Air Force contained almost 22,000 aircraft and 300,000 personnel,¹⁴ and was active in every major theatre of war, including the Middle East, Italy, and, of course, the Western Front. The RAF also performed every sort of operation imaginable, including reconnaissance, artillery spotting, air-to-air combat, air-to-ground combat and long-range strategic bombing. In fact, the RAF at the end of the

¹¹ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume I*. P. 213.

¹² Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. P. 163

¹³ Quoted in Kennett, Lee. *The First Air War, 1914-1918*. New York: Free Press, 1991. P. 42.

¹⁴ Cooper, Malcolm. *The Birth of Independent Air Power: British Air Policy in the First World War*. London: Allen & Unwin, 1986. P. xv.

Great War was numerically superior to the RAF at the beginning of World War II.¹⁵ The RAF was a testament to British industrial power, and the importance of Dominion manpower.¹⁶ This chapter will examine the development of the British air services, from early reconnaissance efforts, to the individual initiatives that changed the nature of aerial combat in various ways, to the more organized efforts of 1917, when the RFC became an active and important part of the battlefield. While the early part of this chapter will examine general trends of aerial operations, as the chapter goes on it will become more specific, as British ground attack efforts grew more concerted and powerful. As will be seen, ground attack had an evolutionary and haphazard development, which affected both the efficacy of air-to-ground combat during the war and the future of ground attack after the war.

In fact, when examining ground attack during World War I, up until the battle of Cambrai, one must be prepared to accept the sheer randomness and purposelessness of the work done in this area by the RFC during this period. To put it simply, ground attack, also known at the time as “low work” and “trench strafing”, was the bastard child of several parents, and, like so many bastard children, was both unexpected and unwanted. This chapter intends to examine both the parents of this unexpected child, and the ways in which the child developed. It will be shown that ground attack descended from a combination of reconnaissance, long-range bombing attacks, and battlefield contact patrols. In addition, it will be shown that ground attack grew haphazardly and without

¹⁵ Not that this is overly surprising, as Western democracies are notoriously hard on their armed forces during peacetime. *Ibid.* P. xix.

¹⁶ Industrially, Britain was the most powerful of the combatants (not including the United States), and the Dominions largely negated any manpower advantage Germany might have had, at least long enough for U.S. manpower to come into play. Kennedy, Paul. *The Rise and Fall of Great Powers: Economic Change and Military Conflict from 1500 – 2000*. New York: Random House, 1987. Pp. 257-259.

purpose, as it took British commanders a long time to work out what to do with this new and unexpected part of the RFC family. The first ancestor of ground attack for the RFC was reconnaissance. Through prewar reconnaissance efforts the RFC attempted, with varying degrees of success, to prove its worth to the British army; once the war began, small bombs were often added to these reconnaissance efforts, to be literally thrown towards targets of opportunity. The second antecedent of ground attack was long-range bombing. These bombing raids, especially against train stations, helped show the vulnerability of ground forces to coordinated air attacks. Finally, the last ancestor of ground attack was the British contact patrol, where RFC pilots and crew attempted to keep contact with British troops on the move during Allied offensives. As aircraft performing this work were just as likely to come into contact with German troops as they were with British troops, many British pilots and crew thought it a good idea to have something to greet the enemy with: namely, bombs and machine-gun fire. From a combination of these three things, as will be shown, came the earliest attempts at ground attack.

Reconnaissance will be the first item examined. Reconnaissance was the first mission that the RFC was capable of performing, although there were doubts about whether the RFC would even be useful in that role. Indeed, despite the size of the RAF at the end of the Great War, Britain's air force had humble beginnings, being the smallest of the major powers by August 1914. While British industry might have been powerful, little of it was dedicated to aircraft. There was little military interest in aircraft before the war, as well. According to General Sir W. G. Nicholson, Chief of the Imperial General Staff, in 1911, "Aviation is a useless and expensive fad advocated by a few individuals

whose ideas are unworthy of attention...’’¹⁷ However, this “useless and expensive fad” would prove its worth only a year later during the army manoeuvres of September 1912, when Royal Flying Corps aircraft for one side spotted the opposing force, and successfully relayed a message regarding the position of the “enemy” to far-out-of-position friendly cavalry. The surprise achieved by the cavalry on the opposing force was considered a turning point in the exercise. Though the RFC was only a few months old, its value had already been shown.¹⁸ In fact, after the exercise the Director of Military Operations at the War Office wrote:

There can no longer be any doubt as to the value of airships and aeroplanes in locating an enemy on land and obtaining information which could otherwise only be obtained by force... Though aircraft will probably have several uses in war, their primary duty is searching for information.¹⁹

This is a succinct, and in many ways accurate, description of what the British air services would initially accomplish in the Great War.

Despite their severe limitations, aircraft proved their worth in 1914 through the one thing they could do well, reconnaissance, just as they had during the exercises of 1912 and 1913. The most significant example of this came early, during the British retreat from Mons, when an RFC pilot reported Von Kluck’s turn south.²⁰ As well, information gathering would continue to be important even after the front lines stabilized.

¹⁷ Quoted in Bullock, David L. Captain, USAFR (Ret). *Swift as Eagles The Victory of the Royal Air Force in Palestine, 1914-1918*. Doctoral Dissertation. Manhattan, Kansas: Kansas State University, 1995. P. 6.

¹⁸ Ironically, the force was spotted and the message relayed by then-Major Hugh Trenchard, and the opposing force was commanded by General Douglas Haig. Boyle Andrew. *Trenchard*. London: Collins, 1962. Pp. 103-104. The Royal Flying Corps was formed in April 1912. Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume I*. P. 199.

¹⁹ Quoted in David L. Captain, USAFR (Ret). *Swift as Eagles The Victory of the Royal Air Force in Palestine, 1914-1918*. Doctoral Dissertation. Manhattan, Kansas: Kansas State University, 1995. P. 19.

²⁰ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume I*. Pp. 316-320.

While the “race to the sea” would technically signal the end of the “reconnaissance era” for the RFC, it can be argued that the difference between observation, which would be the RFC’s most important role for the rest of the war, and reconnaissance, is largely one of semantics. As well, the type of RFC mission known as contact patrol, which will be discussed later, can also be seen as a derivative of reconnaissance.

Indeed, as stated above, reconnaissance led directly to ground attack. On September 1, 1914, a British pilot tossed two bombs over the side of his aircraft while on a reconnaissance patrol, and “caused confusion and a stampede” among some German cavalry.²¹ For pilot Bert Hall in 1915, ground attack consisted of throwing steel darts over the side of his aircraft in the general direction of the German trenches after a patrol.²² For Lieutenant Duncan Grinnell-Milne, flying a two-seat Shorthorn in 1915, ground attack was a constant, but not serious, part of combat as well: “Then at the end of each flight we would generally descend to within a thousand feet or so of the lines for the observer to practise with his Lewis gun and teach the enemy in the trenches to keep their heads down.”²³ At this point, of course, the “moral effect” of a stampede would be as much as one could ask for from RFC officers during 1914, and it would even be acceptable into 1915, due to the limited material effect aircraft could have.

Unfortunately, as shall be seen, this undue emphasis on “moral” as opposed to physical damage would continue, and inhibit the RFC’s effectiveness, throughout the war. This, then, is where ground attack as an offshoot of reconnaissance came into play. Basically,

²¹ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume I*. P. 327.

²² Hall, Bert and Niles, John J. *One Man’s War*. New York: Arno Press, 1980. Pp. 73-74.

²³ Grinnell-Milne, Duncan. *Wind in the Wires*. New York: Arno Press, 1980. P. 56.

as the example given above shows, RFC pilots and crew began taking weapons on their flights, thus adding an extra element to their reconnaissance duties.

In fact, RFC pilots were behind other countries in their reconnaissance/bombing efforts in late-1914. Other countries used aircraft in combat *before* World War I. The Italian Army used aircraft in its 1911 war against the Turks, while in 1912 in the Balkan wars both sides used aircraft. Reconnaissance, of course, was the main purpose for the aircraft, but small (5-pound) bombs were also dropped. The reconnaissance was not as decisive as watchers expected, and the bombs had little to no effect. Not all were discouraged, however. According to Italian officer Giulio Douhet, “A new weapon has come forth, the sky has become a new battlefield.”²⁴

The second antecedent of ground attack was long-range bombing. In this aspect of aviation, the British were also behind other countries. While the British were, by 1912, discovering the value of aerial reconnaissance, other nations were ranging further afield in their experiments:

By 1911 a number of these [aerial contests] had clearly military overtones. The Prinz Heinrichflug in Germany was essentially an exercise in tactical and strategic intelligence gathering, and while open to both civilian and military airmen (German only), it was the military which always came off best. The *Aeroplanturnier* held in Gotha in August 1912 also revolved around the use of the airplane in war, with bombing exercises and simulated attacks on airships. The Michelin Prize or “Aéro-Cible,” organized that same year by the French tire manufacturers, was essentially a contest in bombing accuracy.²⁵

Of course, for the British, as for other nations, combat provided the greatest impetus to experiment with new forms of warfare.

²⁴ Quoted in Kennett, Lee. *The First Air War, 1914-1918*. New York: Free Press, 1991. Pp. 18-19. Douhet, of course, would later become one of the pre-eminent military aviation theorists.

²⁵ *Ibid.* P. 15.

By 1915, military aviation actions that inflicted material damage were becoming more commonplace, even if the damage inflicted was still limited. The first aerial Victoria Cross, for example, was won by Second Lieutenant W. B. Rhodes Moorhouse,

Who on 26 April, 1915, dropped a 100 lb bomb on the railway line near Courtrai station. Because he came down to 300 ft to drop his bomb he was severely wounded by ground fire, yet he managed to fly his B.E. back to his own aerodrome at Merville. He died of his wounds next day [*sic*].²⁶

A 100-pound bomb was the maximum that could be put on the B.E.2b, which was Moorhouse's aircraft. The aircraft carried no other armament.

This early example of air-to-ground combat shows both the potential and the drawbacks of World War I aviation. On the positive side, aircraft, with their long range, could attack important targets, and, if concentrated properly, do significant damage. On the other hand, the slow speed and flimsy designs of Great War-era aircraft meant that they were vulnerable to ground fire, as Moorhouse's death shows. The B.E.2b, in fact, had a top speed of only 70mph at sea level, and slower than that higher up.²⁷

Perhaps what is most disturbing about Moorhouse's attack is the target for which Moorhouse lost his life. The Royal Flying Corps lost a trained pilot (something the RFC would always be short of), merely to damage part of a railway line, something that was probably quickly and easily repaired. While railway stations could be important and vulnerable targets, individual attacks upon them could do little damage, even if a troop or ammunition train happened to be in the area at the time. What, then, was the point of this action? Did the higher command of the RFC not know the fruitlessness of this sort of

²⁶ Bruce, J. M. *The Aeroplanes of the Royal Flying Corps (Military Wing)*. London: Putman, 1982. P. 352. According to Andrew Boyle, however, Moorhouse dropped the bomb on the station itself, not the railway line. Boyle, Andrew. *Trenchard*. London: Collins, 1962. P. 138. Either way, Moorhouse's action, while certainly brave, does not seem like an effective use of resources.

²⁷ *Ibid.* P. 353.

attack, or did they know, and send their pilots out anyway? If so, why? Of course, at this early stage of the war, commanders of the RFC were learning what their aircraft could do, and what the most effective uses of those same aircraft were. As the war went on, attacks would grow in size, with more and more aircraft involved in them. However, attacks that caused large losses for limited gains were a part of a disturbing trend that continued throughout the war, as will be seen.

On September 22, 1916, the Royal Flying Corps felt obliged to produce a document that described both what the RFC planned to do in the future, what it had done in the past and its reasons for both. This document, called *Future Policy in the Air* gives at least part of the answer to the questions asked in the above paragraph. On page one, the document states:

The aeroplane is not a defence against the aeroplane, but it is the opinion of those most competent to judge that the aeroplane, as a weapon of attack, cannot be too highly estimated.²⁸

On the next page, it goes on to say:

On the other hand, British aviation has been guided by the policy of relentless and incessant offensive. Our machines have continuously attacked the enemy on his side of the line, bombed his aerodromes, besides carrying out attacks on places of importance far behind the lines. It would seem probable that this has had the effect so far on the enemy of compelling him to keep back or to detail portions of his forces in the air for defensive purposes.

When Lille station was attacked from the air for the first time no hostile aeroplanes were encountered. The second time this place was attacked our machines encountered a squadron of Fokkers which were there for defensive purposes. This is only one instance among many.²⁹

What these paragraphs indicate is that Moorhouse's attack, to use one example given above, was justified *because it was an attack*. Nowhere in the example given, that of two

²⁸ Public Record Office, Kew Gardens, London, England. Air 1/718/29/1. *Future Policy in the Air*. Sept. 22, 1916. P. 1.

²⁹ *Ibid.* P. 2.

attacks on Lille station, does the RFC document indicate what the military importance of Lille station was. Nor does the document give any indication of what, if any, material damage the attacks on Lille station did. The fact that the Germans were forced to defend Lille station was enough of a justification for the attacks, by itself.

While obviously not as large a priority as air/artillery cooperation, or the gaining of air superiority over the battlefield, ground attack rose to prominence during the battle of the Somme, though in a sporadic way. Most ground attack operations during this period consisted of long-range bombing missions, and not short-range operations involving enemy forces either in or near the battlefield. Both, however, did occur, with varied results.

As has already been stated, the first aviator to win a Victoria Cross did so for a long-range bombing attack. This attack, which cost the pilot of the RFC aircraft his life, was on a train station in early 1915. It was only the beginning. For William Fry, who flew BE2c's at this point in the war, actual bombing raids, in addition to his normal contact patrols, were the order of the day:

A bomb sight had by this time been designed by the Royal Aircraft Factory for use in aeroplanes and our machines were fitted with them. They were fixed on the outside of the fuselage on the pilot's right hand so that he could look over the side and adjust and line up the sight on the target. With a view to future raids we put in an hour or so every day practising with them over the 'camera obscura' on the aerodrome, a device which enabled the pilot's accuracy in the use of the sight to be plotted on a chart and measured. It was all very well in theory but when it came to actual bombing it took an optimist to believe that half-trained and inexperienced pilots, unable to defend themselves, harassed by anti-aircraft shell bursts all round them, and in constant expectation of attack by German scouts could be expected to pinpoint and then concentrate sufficiently to fly the right course to line up the sight on target after first adjusting it for wind speed and direction. I am sure that many, like myself, on occasion dropped their bombs hurriedly when

approximately over the target, then made for home- especially if their flight leader had already done so.³⁰

Between July 15 and September 15, 1916, Fry took part in twenty-two raids; he considered that average for the time.³¹

Trains were favourite targets of planned attacks. Maurice Baring, Trenchard's Private Secretary, related several reports given to him by pilots. On July 1, 1916, for instance, pilot Scott of No. 5 Squadron, RFC, related:

I saw a train about four miles from Cambrai on the Cambrai-Douai line, going towards Douai. I opened from 7,000 feet at it. When it saw me coming it pulled up and started going backwards towards Cambrai; when I was at 1,000 feet I released my bombs. The train pulled up. Suddenly one of my bombs fell 30 yards in front of the rear-coach, destroying the line, and preventing the train going back to Cambrai. Another bomb fell on the embankment. When about 300 feet from the train I came under heavy machine-gun fire. Flying wires, longeron [*sic*], petrol-tank were shot, and several holes in the machine.³²

On the same day, four other pilots, all of whom were brought down and captured, attacked an ammunition train at St. Quentin Station with spectacular results. The account of the operation, from a German soldier who was captured in raid later in the month, best describes the operation:

At the end of the month of June the 22nd Reserve Division was at rest in the neighbourhood of St. Quentin. On the 1st July the Division was warned to proceed to the Somme front. About 3.30 p.m. the first battalion of the 71st Reserve Regiment, and the 11th Reserve Jaeger battalion were at St. Quentin Station ready to entrain, arms were piled, and the regimental transport was being loaded on to the train. At this moment English aeroplanes appeared overhead and threw bombs. One bomb fell on a shed which was filled with ammunition, and caused a big explosion. There were 200 waggons [*sic*] of ammunition in the station at the time; sixty of them caught fire and exploded, the remainder were saved with difficulty. The train allotted to the transport of troops and all the equipment which they had placed on the platform were

³⁰ Fry, William M. *Air of Battle*. London: Kimber, 1974. Pp. 62-63.

³¹ *Ibid.* P. 63.

³² Quoted in Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930. Pp. 153-154.

destroyed by fire. The men were panic-stricken and fled in every direction. One hundred and eighty men were either killed or wounded. It was not until several hours later that it was possible to collect the men of the 71st Regiment. It was then sent back to billets.”³³

Certainly, then, even though attacks were made by small numbers of aircraft, which could only carry small numbers of bombs, important results could be achieved by the RFC.

While not every raid could possibly be as spectacular as the last one described, by attacking targets such as these the air services were making themselves felt in a real, material way.

Organized raids, while always a large part of the ground attack effort of the British, were not the only low work happening at this point, however. Again, some of the best accounts come from the complaints of German soldiers:

Every day one can scarcely show oneself in the trenches owing to the English airmen. It is a wonder that they don't come and pull one out of the trenches so low do they fly. Not one of our German air heroes is to be seen. And yet we are told of the brilliant proportion 81 : 29. The fact of the Englishmen being a hundred times bolder was not mentioned.³⁴

While this account is perhaps unfair to the German air force, which was heavily outnumbered over the Somme, it is a good indication of the new roles British pilots and crew were participating in. One final German account, from a sign placed by troops in the trenches for the British, from Baring's diary entry of July 11, 1916, shows at least some of the effect of British air-to-ground actions: "Tell your ----- Flying Corps to leave

³³ *Ibid.* Pp. 154-155.

³⁴ Quoted in Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930. P. 156. In this case, Baring, an accomplished linguist, also included the original German quotation: "Tagesüber kann man sich kaum in den Graben sehen lassen wegen der englischen Flieger. Dass sie einen nicht aus den Graben ziehen ist ein Wunder, so tief gehen Sie. Von unseren deutschen Helden-Flieger ist keiner zus ehen. Und doch das glänzende Verhältniss 81 : 29. Dass die Engländer tausendmal wagemutiger sind war nicht erwähnt."

us alone. We are *Saxons*.”³⁵ [editing in original] As well, a sign that was common in August 1916 consisted of “God punish England and our flyers.”³⁶ Whatever material effect had been made by the RFC on those German troops, certainly the *moral* effect was everything Trenchard would have looked for in air-to-ground actions by the RFC.

British pilots and crew also gave accounts of ground attack during this period.

According to Captain Alan Bott:

Other guerrilla work is done by craft which, from a height of anything under a thousand feet, machine-gun whatever worthwhile objects they spot. A column of troops on the march, transport, ammunition waggons [*sic*], a train, a stray motor-car—all these are greeted joyfully by the pilots who specialize in ground stunts.³⁷

This quote shows clearly the sporadic and individual nature of ground attack at this time, as only those pilots who “specialized” in ground attack worried about the appearance of targets. Other accounts come from Frederick Libby, an American who volunteered for the war in Calgary, and was an observer during the battle of the Somme and the period leading up to it. Being part of an F.E.2b squadron, which were the workhorses of the RFC during 1916, and capable at both air-to-air and air-to-ground combat, Libby saw a wide variety of combat, including “low work”:

The next few days were uneventful from the standpoint of combat. I learned to use the camera and also to dispose of the ten twenty-pound bombs that are arranged five on a side under the wings. When ordered, we carry these for use against artillery emplacements or anything moving on the ground.³⁸

While the above period refers to the spring of 1916, before the Somme, Libby was also busy doing low work during the summer of 1916:

³⁵ Quoted in Baring, Maurice. *Flying Corps Headquarters, 1914–1918*. London: W. Heinemann, 1930.. P. 157.

³⁶ Kennett, Lee. *The First Air War, 1914-1918*. New York: Free Press, 1991. “Gott strafe England und unsere Flieger.” This, of course, is the origin of the phrase “to strafe.” P. 72

³⁷ “Contact” (Capt. Alan Bott, M.C.). *Cavalry of the Clouds*. New York: Doubleday, Page & Company, 1918. P. 154.

³⁸ Libby, Frederick. *Horses Don’t Fly*. New York: Arcade Pub., 2000. Pp. 148-149.

Our planes are everywhere, protecting our artillery. Planes beetle back and forth across the lines directing their batteries' fire, watch all roads coming up to the front from Hun Land, and engage in low strafing of troops or trucks moving on the enemy side, together with dogfight after dogfight.³⁹

Apparently, there were also consequences to the British habit of attacking German troops:

To be shot down and captured by the German Air Corps is not too bad, but to come down close to the lines where the German infantry can get their hands on you is curtains. They shoot you quick and find a reason later. This is owing to the fact that the RFC often give the infantry a bad time by emptying their machine guns in the trenches on the way home, peppering the boys down there and often dropping a few twenty-pound bombs just for practice.⁴⁰

Whether or not RFC pilots and crew shot down over the trenches could expect to be shot out of hand, Libby's account shows that, while still not orchestrated, the RFC was making greater efforts to directly affect the ground war all the time. Most low work, in fact, came at the end of contact patrols; instead of going home with a full load of ammunition after trying to determine where the infantry was, some enterprising pilots and observers thought of a better use for their machine guns. This was the third antecedent of coordinated, planned, ground attack, and it did not take long for this uncoordinated attacking of German trenches to make a serious nuisance of itself.

The first proof of orchestration would also occur during the battle of the Somme.

On September 14, 1916, Libby wrote:

Tomorrow is the day we have been waiting for. It is another push on the Somme, and we will get to see our tanks go into action. This will mean two shows a day, four hours and three hours, low flying, strafing the infantry and roadways and also providing cover for the tanks.⁴¹

³⁹ *Ibid.* Pp. 167-168.

⁴⁰ *Ibid.* P. 168.

⁴¹ *Ibid.* P. 180.

This description of the first use of tanks in the war, and the air support the tanks were given, demonstrates a trend that would continue throughout the rest of the war. The development of aircraft in a battlefield support air-to-ground role would proceed at much greater lengths whenever there were tanks involved. While it is impossible to state for certain, it seems likely that this was due to the fact that while the head of the RFC, Hugh Trenchard, was generally content to follow in Douglas Haig's footsteps, the tank pioneers, on the other hand, wished to blaze their own trail, and dramatically change the nature of warfare. While "old school" officers like Haig and Trenchard might have had little interest in developing a coherent air support doctrine, for the tank pioneers large-scale air support was definitely in their own best interests. Additionally, with their interest in tanks, the pioneers had already shown their dedication to trying out new styles of warfare; if they were willing to go out on a limb for technology as new and untried as tanks, helping develop new air support doctrine should have been only a small stretch for them.

This is not to say, however, that the support supplied by aircraft to tanks, and the large amounts of material and moral damage that aircraft could do to ground forces such as infantry, was not noticed by RFC's high command. In fact, exactly the opposite was true. Several official RFC documents state that the development in importance of low-flying aircraft and battlefield and rear area air-to-ground operations was duly noted by the RFC. By 1917, especially, the new direction in combat was remarked upon extensively. From the RFC's August 1917 memorandum on changes that had occurred since the battle of the Somme came the statement that:

Fighting not only extended upwards, but downwards; low-flying machines co-operated with the infantry, and attacked men, guns, trenches, transport and hostile aerodromes, flying at a very low height.⁴²

A more detailed examination came from a report produced in October 1917:

Apart from the fighting, the most important development as regards the employment of the R.F.C. has been in the direction of closer co-operation with the infantry. Contact patrol work was introduced at the beginning of the battle of the Somme, and has become a regular part of all active operations, both prior to an attack to reconnoitre the result of our artillery preparation and the state of the enemy's wire and other defences, and during an attack to keep those in command constantly informed as to its progress. Latterly, aeroplanes have taken a more immediate share in the infantry attack itself, actively co-operating by attacking the defending troops with machine gun fire from a low height, and by similarly attacking his reinforcements on their way to the battle front with machine gun and bomb. Further developments in this direction are almost certain.⁴³

While "further developments" would take place shortly after this report was written, during the battle of Cambrai in November 1917, there is a whole year of development, from the end of the Somme to the period before Cambrai that must be dealt with first.

For much of 1917, just as in 1916, much of the ground attack efforts of the RFC were of a sporadic and individual nature. On July 31, 1917, Lieutenant R.A. Maybery of No. 56 Squadron made a name for himself with one extended flight. During this flight he attacked Heule aerodrome multiple times, Courtrai Station, Heule aerodrome again, Ceurne aerodrome, a train going to Menin, a column of infantry, a German aircraft, which he shot down, more infantry and another train. Fortunately for the Germans, at that point he ran out of ammunition.⁴⁴

⁴² Royal Air Force Museum. MFC 76/1/4 (Trenchard Papers). "A REVIEW OF THE PRINCIPLES ADOPTED BY THE ROYAL FLYING CORPS SINCE THE BATTLE OF THE SOMME" Aug 23, 1917. P. 3.

⁴³ Royal Air Force Museum. MFC 76/1/4 (Trenchard Papers). "OFFENCE versus DEFENCE IN THE AIR" October 1917. P. 5.

⁴⁴ Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930. Pp. 248-250. Also Hallion, Richard. *Rise of the Fighter Aircraft, 1914—18*. Annapolis: Nautical & Aviation Pub., 1984. Pp. 128-129. The latter account also gives a detailed map and flight path of the action.

Perhaps the most famous individual low-level work of 1917 belonged to Canadian William “Billy” Bishop. On June 2, 1917, Bishop took off in the early morning in his Nieuport 17 and allegedly attacked a German aerodrome, strafing the aerodrome, and shooting down several aircraft that took off in pursuit of him.⁴⁵ Bishop won the Victoria Cross for this action. Like Maybery’s action, detailed above, this was a purely individual action. Even though much credit must be given to these individuals for undertaking these feats, in the context of the war as a whole they accomplished very little. What is more important is that in 1917 the RFC began to undertake more systematic ground attack missions.

As opposed to individual missions, the RFC as a whole reported on September 20, 1917, that:

Low flying aeroplanes have been very active through-out the day, firing on the enemy’s troops in the trenches, in shell holes, parties of troops on the roads and working behind the lines, active batteries, machine guns and transport. In nearly all cases the pilots reported that the men ran in every direction...

A large number of machines were employed carrying out these low flying expeditions, and well over 12,000 rounds of ammunition were fired by these machines.⁴⁶

For various battles throughout 1917 air-to-ground work occurred on a somewhat more organized basis. For the battle of Arras, during April 1917, for example, “During the contact patrol work many attacks with machine-gun fire were made on detachments of

⁴⁵ This paper will treat Bishop’s claims at face value. There are several works detailing Bishop’s career and this mission, in particular. These include Bishop’s own memoirs, Bishop, William Avery. *Winged Warfare Hunting the Huns in the Air*. London: Hodder and Stoughton, 1918, as well as various biographies, including McCaffery, Dan. *Billy Bishop, Canadian hero*. Toronto, Ont: Lorimer, 1988 and Bishop, William Arthur. *The Courage of the Early Morning: The Story of Billy Bishop*. Toronto: McClelland and Stewart, 1989, 1965. For an alternative point of view see Greenhous, Brereton. *The Making of Billy Bishop*. Toronto: Dundurn Press, 2002. All of these works contain serious flaws, and must be taken with several grains of salt.

⁴⁶ Royal Air Force Museum. 76/1/27. RFC Daily Reports. September 20, 1917. Pp. 1-2.

German infantry.”⁴⁷ Billy Bishop, mentioned above, was also involved in these ground attacks:

We were detailed to fly at a low altitude over the advancing infantry, firing into the enemy trenches, and dispersing any groups of men or working troops we happened to see in the vicinity of the lines. Some phases of this work are known as “contact patrols,” the machines keeping track always of the infantry advance, watching points where they may be held up, and returning from time to time to report just how the battle is going.⁴⁸

As well, an internal RFC memorandum stated on October 5, 1917 “When operations began again this year at ARRAS our machines co-operated with the infantry by flying low and taking part in the battle with the infantry.”⁴⁹

During the battle of Third Ypres, as well, air-to-ground work received at least a modicum of attention. One example comes from the RFC daily report given above. Another comes from July 31, 1917, when, for the first time, single-seat fighters were fitted with bombs for ground attack; previously, as in the case of Bishop, above, the aircraft could only strafe, not bomb. The last-minute nature of this change is indicated by the fact that pilots “were up most of the night before the attack, fitting the improvised bombing racks to the aeroplanes.”⁵⁰ Personal accounts also show the increasing frequency of ground attack done as part of the larger context of the war, rather than on a purely individual basis. From October 9, 1917, towards the end of Third Ypres, comes an account:

⁴⁷ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume III*. P. 346.

⁴⁸ Bishop, William Avery. *Winged Warfare Hunting the Huns in the Air*. London: Hodder and Stoughton, 1918. P. 91.

⁴⁹ Royal Air Force Museum. MFC 76/1/27. “MEMORANDUM OF THE RESULTS OBTAINED BY THE ROYAL FLYING CORPS DURING SEPTEMBER WITH SOME NOTES ON THE WORK OF THE GERMAN FLYING CORPS.” October 5, 1917. P. 1.

⁵⁰ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. P. 163.

The battle of Poelkapelle was on 9 October, with the first battle of Passchendaele beginning three days later. On each of these battle days we were engaged on ground strafing when we always flew in pairs. Our Camels did not carry bombs but our twin machine guns rattled out against troops and transport in the trenches and in the open, on guns and gunners and all objects that offered us a target. These low flying jobs offered excitement. Things flashed into view, were fired at, passed behind and were forgotten with the next target that loomed up. I have seen the field-grey German troops throw themselves down into open shell holes and dig feverishly with clawing fingers as we swooped in pairs upon them with our fire enfilading their position; gunners drop their occupations to scatter into shelter; horses turn and gallop away in terror, dragging swaying waggons [*sic*] along the shell-holed roads until they turned them over; marching troops run in confusion to avoid our bullets. The whole month of October was occupied with days of pushes, big and little. British pushes that nibbled into the enemy system of trenches. They looked insignificant enough perhaps on the map. To the man in the trenches and in the air who carried them through, they were big enough to fill the whole of life's horizon.⁵¹

Perhaps the most interesting account comes from the preliminary to Third Ypres, the battle of Messines, by Lieutenant Norman Macmillan, 45 Squadron, RFC:

Our task was to fly into that tunnel below the flight of the field-gun shells, look for any target we could see- any Germans in trenches, enemy machine-gun posts- anything at all- shoot it up, fly through the 'tunnel' and come out at the other end. We were warned that we must not try to fly out sideways, if we did we would almost certainly meet our own shells in flight and be brought down by them. Once we entered the 'tunnel' there was nothing for it but to carry on and go through to the very end. We flew in pairs. I led, being flight commander. I and my companion flew to the south of the tunnel, turned left and entered it. Instantly we were in an inferno. The air was boiling with the turmoil of the shells flying through it. We were thrown about in the aircraft, rocking from side to side, being thrown up and down. Below was mud, filth, smashed trenches, broken wire, rubbish, wreckage of aeroplanes, bits of men- and then in the midst of it all when we were flying at 400 feet I spotted a German machine-gun post and went down. My companion came behind me and as we dived we fired four machine-guns straight into the post. We saw the Germans throw themselves on the ground. We dived at them and sprayed them- whether we hit them we don't know there was not time to see- only time to dive and fire, climb and zoom onto the next target. We saw a number of the grey-green German troops lying in holes, battered trenches that had been trenches and were now shell holes. We dived on them, fired and again we were firing at a target which we could not

⁵¹ Quoted in Winter, Denis. *The First of the Few: Fighter Pilots of the First World War*. London: Penguin Books Ltd., 1982. Pp. 127-128.

assess. We were being thrown about. A third time we dived on another target and then our ammunition was finished. We flew on rocking out of that inferno, out of the 'tunnel' and escaped. I felt that never at any time had I passed through such an extraordinary experience when we ourselves were shut in by a cloud of shells above real damnation on the ground.⁵²

These last examples, then, show that the ground attack efforts of the RFC were becoming more systematic; instead of being individual, these accounts indicate that the RFC was attempting to help the army in a direct, material way.

That being said, however, it is obvious that by the end of Third Ypres the air-to-ground efforts of the RFC were at best sporadic and at worst mere overpriced nuisances. Air-to-ground combat had developed in much the same way as air-to-air combat: haphazardly, and with no real thought given to the best way to apply this new dimension in aerial combat. The fact that the most noteworthy ground attack efforts of the RFC at this point were the individual attacks of pilots like Bishop and Maybery, as well as the disparaging signs placed in the trenches by German soldiers in 1916, shows that while ground attack was noticed, as RFC documents indicate, it was not a serious priority. The RFC's priority, for better or for worse, continued to be the all-out offensive, which required scout aircraft to be used in the air-to-air role, not in the air-to-ground role. Most "trench strafing" exercises were the secondary result of being on contact patrol, which further shows this point. While some missions, such as those shown above, were dedicated ground attack missions, the majority were just a way of using up ammunition on the way home. Perhaps the official history puts it best:

Such, in brief, was the work of the Royal Flying Corps on the opening day of the battle [July 31, 1917, Third Ypres]. Not much of it was of the kind which had been carefully prepared beforehand, but it represented a determined

⁵² Quoted in Steel, Nigel and Hart, Peter. *Tumult in the Clouds: The British Experience of the War in the Air, 1914-1918*. London: Hodder and Stoughton, 1997. Pp. 232.233.

effort, dictated by the special conditions, to give the infantry a helping hand in weather that would normally have been judged unfit for flying.⁵³

Indeed, much of the RFC's low work up to this point had not been "carefully prepared beforehand", but, as will be shown in the next chapter, this would begin to change in late November 1917, during the battle of Cambrai; it would not be until the British summer offensives of 1918, however, that the changeover would be complete. A comparison might make this even clearer: while ground attack during this period was generally performed from a thousand feet or below, as several quotations have evidenced, air-to-air combat, on the other hand, was usually performed within *fifty* feet of the enemy. If it could be said that firing from anymore than fifty feet away from the enemy was a waste of ammunition, then how much of a waste was firing from a thousand feet? While ground attack had come a long way from the earliest attempts, where small bombs or darts were thrown over the side of two-seat aircraft, there was still a long way left to go in the evolution of low work.

In summary, ground attack developed as extensions of three different aspects of aerial operations: reconnaissance, long-range bombing, and battlefield contact patrols. Individual efforts were what spurred the development of bombing through reconnaissance, as pilots and crew took bombs with them on missions, even before aircraft carried machine guns. What began as individual eventually became systematic, as the increasing importance of ground attack was recognized at higher levels in the RFC.⁵⁴ Long-range bombing was an obvious antecedent of ground attack. If it made

⁵³ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. P. 166.

⁵⁴ This is shown by such documents as Royal Air Force Museum. MFC 76/1/4 (Trenchard Papers). "A REVIEW OF THE PRINCIPLES ADOPTED BY THE ROYAL FLYING CORPS SINCE THE BATTLE

sense to RFC commanders to attack key points such as rail stations well away from the battlefield, then it also obviously made sense to attack key targets closer to the battlefield. Unfortunately, the RFC's penchant towards making large-scale bombing raids did not extend to low work; as will be seen, while bombing raids involved ever larger numbers of aircraft, low work often involved as few aircraft as RFC commanders thought they could get away with. Finally, contact patrols helped place ground attack directly over the battlefield. Again, what began as individual effort became systematic, as the potential effectiveness of low work was seen by larger numbers of individuals. Not until the last British Expeditionary Force battle of 1917, however, would the RFC attempt to make low work a significant factor in its operations even before the battle began. The next chapter will examine the battle of Cambrai, and the next stage in the evolution of low work.

Chapter 2:
Evolution in Practice:
The Royal Flying Corps and Ground Attack
During the Battle of Cambrai, November 1917

Finally we have the Cambrai attack, conceived on a different plan, which commenced with a complete success achieved at a trifling cost.⁵⁵

No author.

When the church bells of England rang in November 1917, they rang prematurely. The battle of Cambrai was not the great victory the British public thought it was; the British Third Army under General Byng made tremendous gains that helped the British public forget about the severe losses incurred during the campaign of Third Ypres, yet the German counterattack erased those gains with relative ease. Instead of a great victory, Cambrai was a *precursor*, both of the partially successful German spring offensives of 1918, and the war-winning Allied offensives of the summer and fall of 1918. For the British air services, the battle of Cambrai was also a precursor, especially of the cooperative work the RAF would do in the summer of 1918.

The battle of Cambrai, though a small action relative to such battles as the Somme and Third Ypres, was the first battle in which technology received pride of place over manpower. Tanks and predicted artillery fire were the main beneficiaries of this attitude change, but the air services, while still in a supporting role, were also able to showcase themselves to their advantage. For the RFC, the battle of Cambrai was the first opportunity to do “low work” on a large scale, as an integral part of the battle. During Cambrai, RFC pilots attacked both troops and convoys in the rear areas, away from the

⁵⁵ Royal Air Force Museum. MFC/13/50. Sykes Papers. Notes on Economy of Man Power by Mechanical Means. Mar 13, 1918. P. 4.

battlefield, and enemy soldiers, artillery and other forces that were in direct contact with British forces. Results were mixed, as were the reactions of British pilots and crew to the actions they were involved in. This section will attempt to show what it was that the RFC was attempting to do during the battle of Cambrai, what was actually accomplished, and what implications these actions had on the final year of the war, 1918.

For pilots of the Royal Flying Corps, Cambrai was a dramatic change from earlier missions. For Sopwith Camel pilot Arthur Lee, of 46 Squadron, things changed on November 9, 1917:

My other flying was a low cross-country, and bomb-dropping practice. We were actually ordered to do the low-level flight, which normally is officially frowned on. Our machines have been fitted with racks under the fuselage to carry four 20 lb bombs and a target has been laid out on the aerodrome, on which we release our dummy bombs. I wonder what's afoot?⁵⁶

Lee's squadron was not the only one practicing new techniques for the coming attack. Other squadrons, newly transferred from England, indicated that they had spent much of their training time working on low-level flying. This was a new thing, as Lee's account indicates. While "low work" and "ground strafing" was performed even before the Somme, and had even occurred in organized fashion at Arras, Messines and Third Ypres, no training for it had ever been done. Of course, just because a pilot practiced did not necessarily mean that he became proficient:

Over the past few days we've been hard at it practising bomb-dropping. You dive at the target until you're at about 100 feet, meanwhile judging the exact moment to release the bomb with the control on the joystick. Pretending you're on the real job, you then flatten out and swerve quickly aside to get clear of the upward burst of the explosion. Dropping dummies at the aerodrome target, with no bullets to bother me, I found it surprisingly easy to get close results, in fact mine were much the best of the squadron. My proudest four, dropped one at a time, were all within a yard or two of the

⁵⁶ Lee, Arthur Stanley Gould. *No Parachute: a Fighter Pilot in World War I/ Letters written in 1917 by A.S.G. Lee*. New York and Evanston: Harper & Row, 1968. P. 154.

target, compared with other people's 100 yards, and one man's 170 yards. I hope this unexpected skill doesn't land me into any awkward jobs!⁵⁷

While Lee's practicing seemed to produce results, the rest of his squadron seemed to have trouble with the process; the fact that they could not improve their accuracy with, as Lee states, "no bullets to bother" them, speaks volumes about their potential proficiency. As well, the last minute nature of the practicing, with orders to practice "low work" only given a few days before the offensive, indicates that the RFC as a whole was not thinking ahead in this matter. On November 18, 1917, Lee related that "This afternoon, Charles, Hanafy and I set off to practice low flying in Camels, which after three days' practice we're supposed to be proficient at."⁵⁸

Orders given before the battle began also indicate the changing nature and increasing importance of air-to-ground attack:

(c) Low flying machines:

(ii) All available D.H.5s and Sopwith Camels will attack troops, transport and other targets on the ground with bombs and machine gun fire from zero + 45 mins. onwards.⁵⁹

Ground attack, then, instead of being a haphazard addition to the Cambrai offensive, was an integral part of it right from the beginning, though preparation for the attack in the form of training was obviously left too late to be as effective as it should have been.

Pilots' accounts confirm how important aerial support was to the offensive, as well as how much bigger it was than previous efforts. Lieutenant Morris of No. 49 Squadron wrote that:

⁵⁷ *Ibid.* Pp. 157-158.

⁵⁸ *Ibid.* P. 158.

⁵⁹ Public Record Office, Kew Gardens, London, England. Air 1/925/204/5/910. 3rd Brigade Operation Order No. 370. November 16, 1917.

In spite of the rain a very large number of our machines did a good deal of valuable work by flying about over the German lines at twenty to thirty feet up and shooting reinforcements etc as they were coming up. Altogether in the RFC thirty machines were lost...⁶⁰

Arthur Lee wrote some of the most detailed accounts of the fighting over Cambrai, which more than confirm the large amounts of work the RFC did during this battle. In a letter home to England, describing the events of the first day of the battle, November 21, he wrote that:

All this time we've managed to keep in loose formation, but now we break up and climb, in order to dive and bomb. At once, we're in the clouds, and have to drop. The 5.9s below are firing, producing more smoke. Charles and Hanafy have vanished, engulfed in cloud and smoke, and so there we are, the three of us, whirling blindly around at 50-100 feet, all but colliding, being shot at from below, and trying to place bombs accurately. Even at this frantic moment, my mind switches to my beautifully dead-on practice bombing on our bullet-free smoke-free aerodrome, but I don't have the time to laugh. The night before, Charlie had indicated which of the seven groups of guns each of us was to tackle, but in this blind confusion there wasn't a hope of picking and choosing. The main thing was to get rid of the darned bombs before a bullet hit them. In a sharp turn I saw a bunch of guns right in line for attack, so I dived at 45 degrees and released all four bombs. As I swung aside I saw them burst, a group of white-grey puffs centred with red flames. One fell between two guns, the rest a few yards away. Splinters suddenly splash in my face- a bullet through a centre-section strut. This makes me go hot, and I dive at another group of guns, giving them 100 rounds, see a machine-gun blazing at me, swing on to that, one short burst and he stops firing.⁶¹

The practice undertaken before the beginning of the battle, then, while better than nothing, unsurprisingly turned out to be no substitute for the real thing. The orders Lee received also turned out to be unrealistic in the face of actual air-to-ground combat. The RFC's lack of experience in dealing with large-scale coordinated "low work" shows through when one examines these accounts carefully. Orders for the same sort of

⁶⁰ Imperial War Museum. London. 68/4/1. 49 Squadron. Morris Lieut J H., November 23, 1917.

⁶¹ Lee, Arthur Stanley Gould. *No Parachute: a Fighter Pilot in World War I/ Letters written in 1917 by A.S.G. Lee*. New York and Evanston: Harper & Row, 1968. P. 163.

operation given in 1918 would be more aware of the fact that ground attack could not be coordinated at too high a level.

The orders given to Lee seem to indicate, however, unrealistic expectations on the part of flight and squadron leaders, not at higher levels of command. Various orders for 3rd Brigade throughout the battle make this clear. From November 23:

3. Low flying machines: Low flying machines will assist the IV Corps advance on SAINS LEZ MARQUION from 7 a.m. with machine gun fire and bombs. One or two flights will be standing by throughout the day to deal with any concentration of troops that may be reported.⁶²

On November 26 came the order:

4. Low Flying Aeroplanes. Low flying aeroplanes in pairs will operate over the Moeuvres-Bourlon-Fontaine front as early after zero as possible. Machines will be detailed to work along the IV Corps line to as far as possible prevent hostile low flying aeroplanes from interfering with our troops.⁶³

Finally, on November 27 comes the order:

2. Low Flying Aeroplanes
Two flights of D.H.5s equipped with bombs will be kept in readiness all day, to leave the ground at very short notice, to assist in repelling any hostile counterattacks by low flying tactics.⁶⁴

These orders display an increased level of sophistication over earlier ground attack attempts, as they have definite units to support and reserves dedicated to low work are maintained as well. Additionally, the orders reflect the changing circumstances surrounding the battle. While the earlier orders deal with assisting the British advance, the final order is designed to help protect against German counterattack. Of course, this counter-attack would come, and be devastating in its effectiveness.

⁶² Public Record Office. Kew Gardens, London, England. Air 1/925/204/5/910. 3rd Brigade Operation Order No. 373. November 23, 1917.

⁶³ *Ibid.* 3rd Brigade Operation Order No. 374. November 26, 1917.

⁶⁴ *Ibid.* 3rd Brigade Operation Order No. 375. November 27, 1917.

For the pilots and crew of the RFC, however, there was probably little change between protecting an advance and helping defend against a counter-attack. Both jobs would have involved large numbers of missions, with extremely high casualty rates. In fact, the casualty rate for squadrons dedicated to ground attack was thirty percent *per day* “on the days when they were employed for organized attacks throughout the battle.”⁶⁵ Obviously, this made low work one of the least favourite occupations of pilots and crew, as personal accounts attest. From Squadron Leader A.H. Curtis of 49 Squadron comes the succinct statement that “Trench strafing is hell.”⁶⁶ Arthur Lee also had something to say on the subject, in a description that came from his diary entry of November 29, 1917:

This trench-strafing is becoming rather a strain. In air fighting, what counts, apart from having an efficient plane, are things like experience, skill, tactics, good flying, good shooting. Plus luck, of course, though chance is only one of the factors. But trench-strafing is *all* chance, no matter how skilled you are. To make sure of your target you have to expose yourself to the concentrated fire of dozens of machine-guns and hundreds of rifles. Compared with this, archie is practically a joke. Of course, strafing behind the Lines is different, the odds against you aren't nearly so great, and you can usually observe results, which is seldom possible in trench-strafing. I've got to admit it gives me the shakes, with so many guns firing you feel every time you dive that it's bound to be your last.⁶⁷

Of course, the fact that he had already been shot down by ground fire twice while “trench-strafing” undoubtably influenced his attitude.⁶⁸ He would not be the last to complain about the strain of “low work.”

⁶⁵ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. P. 239.

⁶⁶ Imperial War Museum. London. PP/MCR/6. Squadron Leader Curtis A H. No. 49 Squadron. P. 91.

⁶⁷ Lee, Arthur Stanley Gould. *No Parachute: a Fighter Pilot in World War I/ Letters written in 1917 by A.S.G. Lee*. New York and Evanston: Harper & Row, 1968. P. 183.

⁶⁸ He would be shot down once more as well, before the battle ended. By the middle of December his squadron commander decided that Lee did not have the nerves for war flying any more, evidenced by severe and reoccurring stomach pains, as well as shaking and nightmares, and sent him back to H.E. (Home Establishment). *Ibid*. Pp. 198 – 209.

What must be asked at this point, then, is whether the results of low work were worth the cost. Every pilot and observer represented a large expenditure in both money and time; as well, airframes and engines were not cheap either, again in terms of both time and money. Varying accounts indicate, however, that while ground attack was costly, it could also be extremely effective. 3rd Brigade, Royal Flying Corps, reported in January 1918 that:

The co-operation with tanks referred to particularly, was on the afternoon of the 23rd November when our tanks were attacking through BOURLON WOOD and being held up by guns, machine guns and infantry. Low flying patrols of 46, 64 and 68 squadrons seeing this attacked these with bombs and machine gun fire, silenced the guns and machine guns and caused the infantry to retire, thus allowing our tanks to reach the North Eastern edge of the wood. It is believed that a tank reported that "the R.F.C. took the objective and that the tanks then occupied it".⁶⁹

An internal RFC document on the action at Cambrai also emphasized the importance of the organized ground attack role:

The special feature of the orders for the R.F.C. was the setting aside of four scout squadrons to act, almost exclusively, against targets on the ground, by bombs and machine gun fire, from a low height. The targets against which these squadrons were used include:

Hostile aerodromes,
Batteries in action,
Infantry, machine guns, and general targets.⁷⁰

The effect of these orders on the squadrons so allocated can be seen in the above accounts written by Arthur Lee, who was in one of the dedicated scout squadrons. One of the more interesting statements in the RFC report on Cambrai is a single sentence lost in the middle of the report: "Further low flying work was ordered according to the situation."⁷¹

⁶⁹ Public Record Office. Kew Gardens, London, England. Air 1/912/204/5/850. 3rd Brigade, RFC to RFC Headquarters. January 13, 1918.

⁷⁰ Public Record Office. Kew Gardens, London, England. Air 1/912/204/5/850. "Notes on the action of the R.F.C." Undated. P. 1.

⁷¹ *Ibid.* P. 2.

In other words, while the dedicated ground attack squadrons had specific *types* of targets to attack, in theory at least these aircraft would be reserved for situations where it seemed they were needed most.

What is most interesting about this document, and accounts from the battle of Cambrai in general, is the type of aircraft dedicated to ground attack. Unlike the Germans, who designed aircraft types specifically for ground attack, the British just reassigned scout squadrons to the new task. In Lieutenant Lee's case, he went from flying Sopwith Camels on high offensive patrols to flying them in a low-level ground attack role. Camels would continue in this role for the rest of the war, despite the fact that in many ways Sopwith Camels were aircraft unsuited for the ground attack role. Camels were agile dogfighters, but they were unstable weapon platforms and vulnerable to ground fire, though, in all fairness, they were no more vulnerable any other British aircraft at the time. While it was speculated at the time that the Camel's agility would make it a suitable choice for air-to-ground work, in fact the Camel's vulnerability completely negated any advantage its manoeuvrability might have given it. After all, Lee was shot down three times in less than two weeks.

This does not mean, however, that the RFC was completely oblivious to the problems inherent in using single-seat fighters designed for high altitude air-to-air combat in a ground attack role. As a result of the Cambrai battle, and the high casualties incurred among ground attack squadrons, the RFC submitted a request for a "single-seat aircraft specifically for ground duties."⁷² The response to this request would eventually turn into the Sopwith Salamander; however, this is a case of too little, too late, as no

⁷² Bruce, J. M. *The Aeroplanes of the Royal Flying Corps (Military Wing)*. London: Putman, 1982. P. 550.

Salamanders made it to France in time for active service over the Western Front. As it was, the best the RFC would come up with was a makeshift armoured Sopwith Camel, of which two squadrons' worth were ordered in March 1918. In fact, the development of the Salamander would be delayed by the ordering of the modified Camels, then the order for modified Camels would be cancelled, and consequently neither would see active service in the war.⁷³

The use of aircraft not designed for the ground attack role clearly shows aspects of the RFC's thinking during this period. The first aspect is the continued emphasis on the offensive; even though ground attack was an integral part of the Cambrai battle, it was still secondary to the RFC's goal of achieving total air superiority over the Western Front. In many ways this was reasonable, however, as the RFC still believed that its offensive policy was causing more casualties to the German air service than it was to the RFC itself. The second aspect is the lack of forethought that went into ground attack operations. It is clear, both from the information previously given, and from the lack of specialized aircraft, that ground attack was not thought about ahead of time, but was instead applied on a case-by-case basis. Like every other aspect of the RFC, ground attack was evolutionary in nature, not revolutionary. However, the next stage of the evolution of ground attack would not occur until the spring of 1918, when the German offensives would force the British to dedicate large amounts of resources to low work. As will be seen, RFC (and, on April 1, 1918, RAF) pilots and crew were forced to play an important role in slowing the German advance, whether they wanted to or not.

⁷³ *Ibid.* Pp. 533, 551-552.

Chapter 3:
Evolution Delayed:
The RFC/RAF and Ground Attack during
The German Spring Offensive, March – April 1918

It is difficult to assess the effectiveness
of the R.A.F. during the German offensive.⁷⁴

No author.

‘Heard about this big push the Huns are
supposed to be going to make any minute?’
‘Heard about it!’ exclaimed Tom Cundall,
‘my God, we hear of nothing else. We’re not
particularly looking forward to it as we’ve got
to go down and shoot it up when it does come.’⁷⁵

Excerpt from *Winged Victory*,
By Victor Yeates

For the Royal Flying Corps, the winter of 1917 to 1918 was a quiet period of rebuilding and anticipation. Both the British air and ground forces were attempting to rebuild after suffering tremendous losses in the preceding year, and both were anticipating a German offensive on the Western Front for the first time since 1916. They would not be disappointed in their anticipation, though they would be disappointed in the short-term results of the German offensives. For the pilots and crew of the RFC, the German spring offensives would usher in what, for most, would be a new type of warfare. During Cambrai, some squadrons of the RFC, as well as a few of the Royal Naval Air Service, had performed what was called “low work”, or, to use more modern parlance, tactical air-to-ground operations, involving both battlefield interdiction and attacks in rear

⁷⁴ Public Record Office. Kew Gardens, London, England. Air 1/675/21/13/1422. Royal Air Force recapitulation of German March Offensive.

⁷⁵ Yeates, V. M. *Winged Victory*. London: Buchan & Enright, 1985, 1934. P. 1.

areas. For most, however, it would be an unpleasant change from the usual routine of high-altitude offensive patrols, and mission washouts whenever there was a speck of bad weather. The previous chapter dealt with the comparatively small amount of low work that occurred during the battle of Cambrai. This chapter will show how the RFC, soon to be the Royal Air Force, advanced beyond what it did during Cambrai, as well as show how far it still had to go. Specifically, this chapter will detail the accomplishments of the RFC/RAF, citing statistical evidence, as well as first-hand accounts from pilots, crew and soldiers of both sides. As well, this chapter shall examine the difficulties inherent in the type of evidence most readily available for historical examination, and, finally, will examine larger issues, such as the production of airframes and engines, to determine whether lack of resources hindered the British air services, as well as the possible causes of any such hindrance. Overall, this chapter will show that the RFC/RAF did a good job using the resources it had, and certainly did its best to let nothing stand in its way in what it considered its primary mission, the support of the British Expeditionary Force. Despite this, there was a lack of vision into the future of aerial combat, and a tendency to do things just because they had always been done that way before. Finally, just because it is *difficult* to assess the effectiveness of the British air services during the German spring offensives, does not mean that it is *impossible*.

One might think, judging by the post-battle and post-war comments of British commanders, especially Douglas Haig, that the year 1918 went exactly according to plan. The Allies, knowing their numbers would grow with long-awaited American reinforcements, confidently stood ready for the expected German onslaught, which was designed to defeat the Allies before the American reinforcements arrived, even though, it

was believed, this would use the same type of tactics as the British had used in previous years. This attack would break upon the tough Allied defences (ironically, copied from the successful German model); thereby allowing the Allies to resume their own successful offensives later in 1918.

While the German attacks of the spring of 1918 eventually did fail, British forces did not anticipate the way that they failed. The Allies expected to stop the German attacks, not for them to run out of steam after taking large amounts of ground. This was as true for the RFC, soon to be RAF, as it was for the British ground forces. However, just because the British did not anticipate the success of the German attack does not mean that they did not anticipate the attack at all. In fact, exactly the opposite was true. Not only was an attack expected, but also by March 19, 1918, RFC pilots were dropping leaflets on German positions wishing the Germans good luck in their attack of March 21.⁷⁶ More importantly, on the evening of March 20 RFC commanders gave squadrons their orders for the coming day, when the offensive would start. For the men of 48 Squadron, the orders were very specific:

At dinner that evening, the C.O. addressed us.

“From now on,” he said, “our job is to hamper the Boche advance. I need not tell you that this Squadron has as fine a reputation as any in France, and it is up to all of us now to maintain that reputation.

“The whole Squadron will go up at five ack emma [a.m.] to-morrow. Each machine will carry bombs. Wherever you see Boche troops or transport, dive on 'em, and give 'em hell! We can do an appalling amount of damage this way. The Bristols will go over as low as possible and strafe debussing points, and all cavalry, infantry, and emma toc [M.T., mechanical transport] on the roads. The Bristols will be the lowest machines as they can do the most damage with their two guns and bombs. Camels and S.E.5's will sit above

⁷⁶ Middlebrook, Martin. *The Kaiser's Battle: 21 March 1918: The First Day of the German Spring Offensive*. London : Allen Lane, 1978. P. 131.

you to deal with E.A. [enemy aircraft] Directly you have emptied your ammunition-belts come back, fill up and go over again.”⁷⁷

In fact, there was at least some thought towards the use of the RFC to help against German assaults, even earlier than the example given above. On March 4, 1918, Haig wrote in his diary that:

Gen. Salmond (Trenchard’s successor) reported all his plans to meet possible attacks on our third [*sic*] and 5th [*sic*] Army fronts- also to support French if [circumstances] require it. S[almond] seems quite capable, and most pleasant to work with.⁷⁸

As well, on March 11, Haig wrote that:

Gen. Salmond reported on air service – our losses have been very small lately, and all are anxious that the enemy should attack. Front of 3rd [*sic*] Army has been specially quiet, possibly to mislead us! The Brigades in the adjoining armies... are ready to go out to support the 3rd [*sic*] Army in receipt of a telephone message.⁷⁹

Whether or not those telephone messages ever arrived, and despite the unexpected German success, which caused many squadrons to spend more time relocating (retreating) than flying, a large part of the RFC was involved in the conflict right from the beginning, in exactly the manner described by the 48 Squadron commander, given above.

This part grew as the offensive wore on. From March 21 until the middle of April, all RFC aircraft fired more rounds *each day* than were fired in any previous *month*, with the exception of only two days. To put this in perspective, the previous record holding month for most rounds fired was February 1918, when the RFC fired 29,000 rounds.⁸⁰ On March 21, the RFC fired 40,860 rounds at ground targets. Things slowed

⁷⁷ Voss, Vivian. *Flying Minnows: Memoirs of a World War One Fighter Pilot, From Training in Canada to the Front Line, 1917-1918*. London : Arms and Armour Press ; New York : Hippocrene Books, 1977. P. 131.

⁷⁸ *The Haig Papers*. Diary. March 4, 1918.

⁷⁹ *The Haig Papers*. Diary. March 11, 1918.

⁸⁰ A caveat is in order here. Large amounts of air-to-ground work was done during the Cambrai offensive, as has been shown in the previous chapter, and it is quite possible that the numbers for November 1917

down over the next two days, with the RFC firing 11,227 rounds on March 22, and 17,655 on March 23, due to both inclement weather and squadron relocation. The numbers jumped dramatically on March 24, however, when the British fired 84,670 rounds, and again on March 25, when they fired 100,000 rounds. On the March 26, this number doubled, with 200,000 rounds being fired. Overall, the RFC fired nearly one million rounds between March 21 and March 31.⁸¹ Most of these rounds were fired at ground targets.

There is no doubt therefore, that the RFC/RAF did a large amount of work during the German Spring Offensive. While the numbers above are only for March 1918, the RAF was also busy during April, with the RAF firing another 700,000 rounds between April 1 and April 18, 1918.⁸² Trying to discern the RAF's accomplishments, on the other hand, is far more difficult.

Certainly, the sheer amount of work done by British fliers guaranteed that they had to have some effect on the battle. First-person accounts verify this, as do squadron combat reports. For example, from the War Diary of No. 3 Squadron comes many descriptions of low work, starting with the early morning of March 21: "Capt. Bell did good work with his bombs on two column of transport... Lt. Franklyn and Lt. Maddox also did some very good work... Capt. Leman went out by himself on an important low

would be bigger than those for February 1918. However, the RFC did not keep detailed ammunition expenditure records until January 1918, and only a small number of squadrons were involved in the Cambrai offensive, so it is impossible to say for sure. Regardless, the rounds fired during the spring offensives were by far the largest ever expended, whether the next highest month be February 1918 or November 1917.

⁸¹ Public Record Office. Kew Gardens, London, England. Air 1/475/15/312. Summary of Work (Western Front).

⁸² *Ibid.*

reconnaissance with very successful results.”⁸³ From the entry of March 24: “Enemy troops and transport bombed and machine gunned... Great havoc worked by all pilots on close masses of enemy during the attack on VRAU VAUCOURT. Very successful bombing and machine gunning.”⁸⁴ Also, from March 25: “Lt. Cameron routed a column of enemy infantry, killing the O[fficer] C[ommanding] and other mounted Officers at the head of the column. Many casualties observed.”⁸⁵ Work was steady, as well. For No. 3 Squadron, despite uneven weather, which caused the cancellation of many missions, there was no completely “dud” day until March 30, and even on this day, there was one attempted mission, which washed out due to the weather. There was also squadron relocation, which occurred on the night of March 21 to March 22, after multiple missions during the day, and another relocation from March 25 to March 26. Altogether, between March 21 and April 17, No. 3 Squadron performed or attempted to perform 46 missions, of which 39 were “low work.” Interestingly, of these 46 missions, the squadron performed 30 of them from March 21 to March 31, 1918.⁸⁶ For No. 3 Squadron, at least, the crisis caused by the German offensive was largely over by the end of March.

For No. 1 Squadron, RFC/RAF, the last week of March 1918 was also busy. On March 26, for instance, the amount of work performed by No. 1 Squadron, mostly by pilots who had been temporarily transferred to No. 40 Squadron, as it was based closer to the axis of attack between Third and Fifth Armies, was great enough to require separate documents, from the usual short work summaries. For example:

⁸³ Public Record Office. Kew Gardens, London, England. Air 1/166/15/142/19. No. 3 Squadron War Diary. March 21, 1918.

⁸⁴ *Ibid.* March 24, 1918.

⁸⁵ *Ibid.* March 25, 1918.

⁸⁶ *Ibid.* March 21 – April 17, 1918.

Summary of work carried out by low flying patrols over BAPAUME FRONT.

The following pilots dropped bombs and shot at the following ground targets:-

Capt. Hamilton, Lieuts Hollis, Gray, Clayson & Magoun dropped bombs on BAPAUME and on the Railway N.E. of the town from 200 feet, with good results, causing general panic.

Lieut Rigby attacked enemy troops with machine gun fire also dropped 4 bombs on COMBLES. Troops were scattered.

The following dropped bombs in the neighbourhood of BAPAUME on enemy troops in the fields and scattered same with machine gun fire:-

Lieuts. Owen, Bateman and Mawbey.

Lieut Donovan attacked a column of infantry on the march along main road at VILLERS by dropping bombs from a height of 100 feet – enemy scattered and fell and general panic ensued.

Lieut Sweeting dropped bombs on road near ST QUENTIN and fired 150 rounds into horse transport from 200 feet and completely dispersed them. 2 Pilots failed to return and 1 forced [*sic*] landed.

BAPAUME AREA was patrolled 12-25 to 1-45 p.m. and 24 bombs were dropped, trenches and troops on roads were attacked with machine gun fire with good results – A camp at SAMPIGNIES was attacked by bombs and the personnel, horses and transport was dispersed in absolute disorder – later the camp was seen to be in flames.

The following pilots bombed the camp and circled around firing heavily as the camp stampeded:-

Lieuts Mawbey, Gray, Hollis, Owen & Magoun.

After attacking this place Lieut Rigby also attacked troops at FAVREUIL causing disorder, Lieuts Batemen, Magoun and Hollis fired into new enemy trenches and shot down troops in fields, from a very low altitude.

Lieut Clayson dropped bombs on enemy cavalry and limber wagons from 300 feet observing 2 direct hits and causing a stampede among the horses, he also fired 250 rounds at the same target with machine gun – completely dispersing the enemy.

No. 1. Squadron carried out the evening patrol of the BAPAUME AREA, attacking with machine gun fire and dropping bombs, with good results:- Lieut Rigby dropped 4 bombs on BIHUCOURT where troops were seen in the village – enemy scattered in all directions. He observed a large infantry column moving along a back road from SAPIGNIES to BIHUCOURT about 5-5 p.m. He attacked with machine gun fire and scattered the troops. He also fired 300 rounds at point blank range at an Albatross Scout, which went down in flames near BAPAUME.

Lieut Sweeting bombed BAPAUME roads – bombs were seen to explode in the middle of a town. Saw columns of infantry in four's between

CROISELLES and FONTAINE les CROISILLES and fired 700 rounds into enemy who ran in all directions in a general panic – He also fired on transport in this area. The general confusion in the infantry was particularly noticeable. The transport was observed to pile up in a heap.

Two dumps were seen to go up and many fires were observed both sides of the lines.

Lieut Mawbey dropped bombs on BAPAUME and observed troops and horses scatter – he also fired on troops in a compound and troops either fell down or scattered in disorder.

Lieut Magoun was unable to drop his bombs owing to some radiator trouble.

Lieut Owen also was not able to release his bombs, but fired 300 rounds at enemy guns on the ARRAS – BAPAUME road, the men fell down.

2 Pilots failed to return.⁸⁷

For No. 1 Squadron, March 27 and 28 were just as busy as March 26, and needed the same special, extended Summary of Work. Again, however, by the end of March the busiest stretch of low work was complete, and the pilots of No. 1 Squadron, mostly back from their temporary transfers on March 29, were back to regular offensive patrols by the time the weather cleared in early April. No other days in the late-March to mid-April period required special separate Summaries of Work.

During those three days, however, the transferred pilots of No. 1 Squadron, as the one Summary of Work indicates, were busy. Specifically, on March 26, eleven pilots performed 22 missions, on March 27, nine pilots performed 22 missions, and on March 28, eight pilots performed fifteen missions.⁸⁸ This was a three-day average of approximately two missions per day, and at least double the average of the days surrounding these three days.

Of course, not all aspects of day-to-day work performed by pilots and crew of the RFC/RAF changed dramatically with the coming of the German offensives. For artillery observation squadrons, such as No. 9 Squadron, the RFC/RAF was little changed from

⁸⁷ Public Record Office. Kew Gardens, London, England. Air 1/1333. No. 1 Squadron Summary of Work. March 26, 1918.

⁸⁸ *Ibid.* March 26 – 28, 1918.

March 20 to March 21, 1918. While No. 9 carried bombs and attacked ground targets during the offensive, the squadron, which consisted of RE.8s, still carried on with its primary mission, counter-battery observation. Additionally, aircraft of the squadron had carried bombs *before* the offensive began; largely, the offensive provided a greater variety in targets for those bombs than had existed before.

In fact, even though the RE.8 had the ability to carry over 200 lbs in bombs, as well as a standard fuselage mounted Vickers and crew served Lewis machine gun, the pilots of No. 9 Squadron showed a remarkable tendency to avoid anything that even came close to resembling low work. Examining No. 9 Squadron's Squadron Record Book makes this clear. While nearly every aircraft reported dropping bombs, usually two, and firing one or both guns at ground targets, the vagueness of the targets and results reported, in addition to the height at which these actions were undertaken, indicate that low work was neither required of this squadron nor desired by the pilots involved. For example, on March 23, 1918, Lieutenants Harris and Diespecker reported "200 rounds (Lewis) fired at houses &c., at Woumen, from low altitude."⁸⁹ While the exact altitude at which this action took place is not given, one can make a guess based upon the altitudes reported by others in the squadron. On March 24, Lieutenants Hill and Coombs reported "Machine hit twice by hostile Machine guns. 300 rounds (Lewis) fired into Forest from 900 ft."⁹⁰ On March 25, Lieutenants Young and Routledge reported, "50 rounds (Vickers) fired at Cross roads... from 1000 ft."⁹¹ Also on March 25, Lieutenants Newton and Reynolds reported "2-20 lb bombs dropped over Houthulst Village; unobserved

⁸⁹ Public Record Office. Kew Gardens, London, England. Air 1/1245/204/6/57. No. 9 Squadron Record Book. March 23, 1918.

⁹⁰ *Ibid.* March 24, 1918.

⁹¹ *Ibid.* March 25, 1918.

owing to clouds. 200 rounds (Lewis) fired into Nachtegaal & Strovendorp. 1200 ft.”⁹²

On March 26 Lieutenants Boswood and Hibbs reported “300 rounds (Lewis) fired from 1000 feet, into battery positions... 100 rounds (Vickers) fired from 1000 feet...”⁹³

Finally, on March 27, Lieutenants Jelffs and Ralph reported “50 rounds (Vickers) fired... from 1200 feet. 100 rounds (Lewis) fired... from 1500 feet.”⁹⁴ Obviously, compared to the work other squadrons were doing, such as Sopwith Camel and Bristol Fighter squadrons, the work of No. 9 Squadron did not count as low work at all; certainly not by spring 1918 standards, anyway. Amazingly, however, the altitudes reported above were actually an improvement over past performances. On March 18, for example, Lieutenants Jelffs and Ralph, while performing a Flash Reconnaissance, reported, “100 rounds (Vickers) fired from 2000 feet into O.22.”⁹⁵

In many ways, however, the secondary nature of “low work” performed by reconnaissance and artillery spotter squadrons, as represented by No. 9 Squadron, is a good sign for how the RFC/RAF managed its duties. The fact that the British air services were in a good enough position to leave No. 9 Squadron to its primary role of artillery spotting means that while the situation for the British in late March 1918 was desperate, it was not as desperate as it might have been. The fact that bombing and ground strafing was, at best, of secondary importance to No. 9 Squadron also shows how the RFC/RAF never lost sight of the fact that its major role was to support the army, and that artillery spotting was perhaps the most important way this support could occur. As well, the fact that low work was of small importance to artillery observation squadrons does not mean

⁹² *Ibid.*

⁹³ *Ibid.* March 26, 1918.

⁹⁴ *Ibid.* March 27, 1918.

⁹⁵ *Ibid.* March 18, 1918.

they were not busier than they were before the offensive began. In fact, despite mist and uneven weather conditions, No. 9 Squadron did, on average, over three times as many “jobs” per day as they did in the days before the offensive; this even more than No. 1 Squadron, which, as indicated above, did twice as much work per day as before the offensive. In this case, however, the work performed after the beginning of the offensive was generally of the same nature as the work performed before the offensive, only more so. As we have seen, and will continue to see, this was not the case for many of the other squadrons fighting over the Western Front, not only during the German offensives, but also for the rest of the war.

The reports of pilots and other RFC/RAF figures also help show how busy most of the air services were during this period. For example, according to Squadron Leader Sholto Douglas, pilots of 84 Squadron were:

presented with perfect ground targets – troops marching in fours along the roads, batteries and ammunition wagons moving across the open. One could thus see plainly what one was attacking; and what is more, see the effect of one’s bombs and gun-fire. Troops would scatter into the fields, leaving men lying prostate in the road; wagons and horses would be thrown into confusion and overturned. One pilot overturned a general’s car into a ditch. One felt that one was directly helping to stop the enemy’s victorious advance.⁹⁶

One of the more detailed diaries from the period belonged to a Lieutenant E. E. Stock, a pilot with 54 Squadron. On March 21, he wrote:

After lunch I was ordered to lead a formation along the St. Quentin – Estrees Rd and bomb and fire at the enemy infantry and transport. We had never undertaken this sort of “job” before, our life before this push began was far more restful, as we seldom did more than 3 hours a day on Offensive Patrol which meant flying at anything from 15,000 ft to 20,000 ft attacking hun [*sic*] scouts and two seaters. On this occasion we carried two 20lb bombs and about 800 rounds of ammunition. Our object was to get rid of our bombs at

⁹⁶ Imperial War Museum. London. P. 34. Marshal of the RAF Lord Douglas of Kirtleside October 15, 1922. P. 35.

the earliest opportunity as they were a handicap on a “camel” owing to the weight.⁹⁷

These are just a small percentage of the accounts available that detail how busy RFC/RAF pilots were during the German offensives; while more of them shall be examined later on, the following section will examine another aspect of low work, that is hinted at by the Stock’s account.

Perhaps what is most interesting about the above quotation is the change of roles Lieutenant Stock had to deal with. For example, while this paragraph does not show precisely how stressful low level combat actually was, it does give an indication, due to the way Stock describes his previous air-to-air combat role as being “restful.” Lieutenant Vivian Voss of 48 Squadron indicated in his diary that he thought the same as Stock about the stress of “low work” compared to offensive patrols:

Ground-strafting was undoubtedly bad medicine for the Boches but it was a bit trying for us, too. From the moment we reached the advancing line of grey we were under continuous and sometimes heavy fire from Archie, machine-guns, rifles, and flaming-onion batteries. In the days to come we were often to think back regretfully on the peaceful high O. Pips [offensive patrols] that had formerly been the order of the day.⁹⁸

Bill Lambert, an S.E.5a pilot wrote, “Our low work today has been hellish. I never did like this ground strafing.”⁹⁹ Lieutenant A.G. Lee, who fought in the battle of Cambrai, also reflected these thoughts, when he wrote in a letter home on November 28, 1917, that: “It was something of a relief to be on patrol again, instead of doing ground-strafting. I don’t like it overmuch, in fact I don’t like it all. Nor does anybody else in the

⁹⁷ Imperial War Museum. London. 86/8/1. Lieutenant E. E. Stock. Diary. Pp. 9-10.

⁹⁸ Voss, Vivian. *Flying Minnows: Memoirs of a World War One Fighter Pilot, From Training in Canada to the Front Line, 1917-1918*. London : Arms and Armour Press ; New York : Hippocrene Books, 1977. P. 146.

⁹⁹ Quoted in Hallion, Richard P. *Rise of the Fighter Aircraft, 1914-1918*. Annapolis : Nautical & Aviation Pub., 1984. P. 135.

squadron.”¹⁰⁰ Apparently, low work in 1918 was no more enjoyable than it was in 1917. After only one day of low work, three hours a day of offensive patrols might have seemed like light work, especially to an infantryman, and did seem like light work to Stock. However, the number of stress related casualties that the RFC had taken over the course of the war indicates that Offensive Patrols were anything *but* light work. Many British aces were famous for their “mental breakdowns,” for lack of a better term, including “Mick” Mannock and Albert Ball. How much more stressful must “low work” have been?

Numerous conditions would have worsened this stress. One condition was the aircraft the pilots flew. World War I era aircraft were slow and extremely vulnerable to ground fire; both Mannock and Manfred von Richthofen, the Red Baron, were shot down by ground fire (though there is still some controversy surrounding Richthofen’s death), and they spent very little time enduring small arms fire. For pilots who had spent very little time previously at low altitudes to suddenly be spending all of their time performing tactical air operations, the change must have been stressful indeed. On March 26, only five days into the offensive, Stock wrote, “The strain of ‘ground strafing’ was beginning to tell on us.”¹⁰¹ Finally, according to pilot and author Victor Yeates, “This low work was the last occupation on earth for longevity.”¹⁰² Of course, it would tell in ways other than just stress.

The other major way that “the strain of ‘ground strafing’” would tell on RFC/RAF pilots and crew would be through extremely high casualty rates. According to the RAF’s

¹⁰⁰ Lee, Arthur Stanley Gould. *No Parachute: a Fighter Pilot in World War I/ Letters written in 1917 by A.S.G. Lee*. New York and Evanston: Harper & Row, 1968. P. 181.

¹⁰¹ Imperial War Museum. London. 86/8/1. Stock. P. 36.

¹⁰² Yeates, V. M. *Winged Victory*. London: Buchan & Enright, 1985, 1934. P. 22.

Summary of Work for the German Spring Offensive, between March 21 and April 10 (inclusive), the “Total number of machines wrecked and missing” was 743.¹⁰³ To put it another way, of 1,232 total aircraft listed in the RFC Order of Battle for March 21, 1918,¹⁰⁴ over 60% were wrecked or missing by April 10. As well, casualties for March 1918 were 245 killed or missing, and for April 1918, 194 killed or missing.¹⁰⁵ These numbers represent a dramatic climb in losses over the previous three months, where less than 100 men were killed or missing each month. Interestingly, however, they are not much higher than the average month in 1917, and are actually dramatically lower than that most infamous of months, April 1917, “Bloody April”, where 316 RFC pilots and crew were killed or missing.¹⁰⁶ One must remember, though, that most of March was a quiet month. Add together the casualties of March and April 1918, and treat them as one month, since most of the casualties for this period occurred after March 21 and before the middle of April, one gets 439 killed or missing British flying personnel, which would be by far the largest number recorded for any one month period up to that point. Even if one took 100 casualties, or nearly twenty-five percent, off this number, to bring down the total to 339, this would still leave the “month” of March-April 1918 with significantly more casualties than there were in April 1917. As well, the number of hours flown per casualty, a number that had been steadily rising during the first two months of 1918, dropped to under two hundred hours per casualty during March and April 1918, before

¹⁰³ Public Record Office. Kew Gardens, London, England. Air 1/475/15/312. Summary of Work (Western Front).

¹⁰⁴ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. Pp. 446-451.

¹⁰⁵ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. P. 161.

¹⁰⁶ *Ibid.* P. 161.

rising above 200 hours again in May.¹⁰⁷ Not only were casualties occurring more frequently in regards to the numbers of hours flown, but also those hours were coming at a faster rate, as many more hours per day were being flown than before. When Sholto Douglas stated “During the whole of that strenuous fortnight No. 84 Squadron suffered only one casualty: and that was the result of an aerial combat,”¹⁰⁸ obviously his squadron was the exception, not the rule. March and April 1918 was an enormously stressful period for RFC/RAF pilots and crew, as casualties were occurring at a much higher pace than earlier, especially when compared to the quiet months of December 1917 to February 1918.

Other accounts show the difficulties and dangers of low work. German officer Leutnant Fritz Nagel, of Anti-Aircraft Gun Battery, K Flak 2, wrote of his actions on March 27, 1918:

First I saw explosions in front of us while we drove along one of the side streets. Looking up, I saw several Bristol double-deckers looking enormously big as they flew no more than thirty metres above us. We survived the next explosion, but it was awfully close. We were in a tight spot. It would only take one bomb to cause our ammunition to explode. There were four planes or more, flying fast – much too fast for aimed fire at so low a target. I blew ‘Man the Gun’, and the crew jumped on the truck and set shrapnel at point-blank range, maximum ammunition, straight up. When we saw the wings of the wings of the Bristols coming over the rooftops we blasted away so fast I thought the whole gun might topple over. Within seconds I saw one plane hit, coming down squarely as if it would fall on top of us. We reloaded and waited. Again they came over the rooftops. Fortunately, at the very last second, I recognized that these planes were triple-deckers, belonging to the Richthofen squadron, and I was thankful that the crew were disciplined enough not to have started firing before I gave the signal. To shoot down Richthofen, the national hero, would have been awful!¹⁰⁹

¹⁰⁷ *Ibid.* P. 161.

¹⁰⁸ Quoted in Travers, Tim. *How the War was won: Command and Technology in the British Army on the Western Front, 1917-1918*. London : Routledge, 1992. P. 86.

¹⁰⁹ Quoted in MacDonald, Lyn. *To the Last Man: Spring 1918*. London : Viking, 1998. P. 277.

This account clearly shows the dangers of “low work.” Even though Leutnant Nagel’s battery was firing un-aimed shots, with very little time before the British aircraft passed them by, and very little warning, they still shot down one aircraft.

From the War Diary of No. 3 Squadron, also, one can get a sense for the number of casualties low work entailed. For example, from March 21, 1918 to April 12, 1918, No. 3 Squadron incurred eleven casualties. Of these, two were definitely the result of ground fire during low work, six occurred during ground attack operations, with no reason given for the casualty, two occurred while engaged with enemy aircraft, with no reason given for the casualty, and no details at all were given about the final casualty.¹¹⁰ Overall, it is likely that eight, and possibly even nine, of the eleven casualties incurred by No. 3 Squadron during this period were from ground fire. This is a high percentage, and certainly explains various pilots’ desire to go back to offensive patrols.

While the above information illustrates in some ways the difficulty of air-to-ground combat, it does not indicate how successful these actions were. Did the RFC/RAF get results that justified the costs of their actions? Obviously, this is a difficult question to answer. Inherently, there was no way for Allied pilots to give a detailed account of their actions; they could confirm air-to-ground victories against German troops no more easily than they could confirm many of their air-to-air victories. As British aircraft spent much of the war over hostile territory, as opposed to German aircraft, who fought more of a defensive war, discerning what Allied pilots and crew did at any point in the war has always been difficult. For instance, in Sholto Douglas’s first account above, even if the German general’s car overturned, there is no way to tell what

¹¹⁰ Public Record Office. Kew Gardens, London, England. Air 1/166/15/142/19. No. 3 Squadron War Diary. March 21, 1918 to April 12, 1918.

happened to the general himself. Was he killed, wounded or even in the car at all? While the accounts detailed above give an indication of at least some effectiveness, many accounts are not as detailed as these are, even if one takes the above accounts at face value. For example, from the 208 Squadron, RAF (formerly 8 Squadron RNAS), Diary of Work for April 15 to 21, 1918, as well as April 25, 1918, comes the following account:

2000 rounds were fired at ground targets during the day.
 1900 rounds fired at ground objectives.
 5700 rounds fired at ground targets E[ast] of Merville.
 3000 rounds at objects E. of Merville & along La Basse Canal.
 750 rounds fired into trenches near La Bassee.
 2500 rounds fired into Merville & vicinity.
 1650 rounds fired into roads around Merville.
 56 bombs dropped in vicinity of Merville, Laventre, Lestrem & Iron Buyard.
 3350 rounds fired into Merville, etc.¹¹¹

Certainly, then, 208 Squadron was active, and contributing to the large amounts of ammunition expended by the RAF during the Spring Offensive.¹¹² From the "Pilot's Flying Log Book" of Captain J Gilmour for March 31 to April 4, 1918, one gets the same sense:

4 Bombs on troops in Foucaucourt.
 100 rounds fired at AA Battery in action.
 Bombs on Infantry from 150 ft.
 Fired on troops 1000 rounds.
 Dropped bombs on troops E. of Moreuil & fired 400 rounds at Infantry.
 Bombs on troops S.E. Moreuil.
 150 rounds on various targets.
 Bombs dropped on barn N.E. of Moreuil.
 400 rounds fired on Infantry.
 3 bombs on battery S.E. of Lamorte.
 4 bombs on Infantry.¹¹³

¹¹¹ Public Record Office. Kew Gardens, London, England. Air 1/183/15/214/5. No. 208 Squadron, Diary of Work.

¹¹² Interestingly, for the commander of 208 Squadron, Major Chris Draper, the most note-worthy event of this period was when, on April 10, 1918, he was forced to burn his entire squadron of Camels due to the combination of inclement weather and fast-moving German troops. Draper, Christopher. *The Mad Major*. Letchworth, England : Air Review Ltd., 1962. P. 81-82.

¹¹³ Imperial War Museum. London. 80/15/1. Gilmour, Captain J. No. 65 Squadron Log Book. March 31 – April 4, 1918.

While Gilmour's logbook gives more detail than the 208 Squadron account, it is still difficult to get any sense of actual real accomplishment from accounts such as these. There is no indication of whether Gilmour flew alone, or in formation, or from what height he attacked (with one exception), or what sort of casualties he inflicted, if any. From the 208 Squadron account, given above, there is also no real indication of effectiveness. The information from the 208 Squadron Diary does not tell how concentrated the attacks were, in neither time nor space, nor does it indicate whether the attacks were in conjunction with other squadrons' work, or the needs of the Allied infantry, or whether 208 Squadron was just picking random targets of opportunity. Fortunately, some accounts, such as Lieutenant Stock's, are more detailed:

I saw what seemed to me to be a long wall of sandbags... diving at enemy behind it I noticed that it was a wall of dead bodies heaped one upon the other!... I was able to sweep this wall with machine-gun fire until there must have been a hundred or so german [*sic*] soldiers to add to their human wall.¹¹⁴

Again, even if Stock's report can be taken at face value, and he did kill approximately one hundred German soldiers (like victory claim rates, this number should probably be divided by three to achieve a more accurate result), there is no indication of the context of this work. While there is no way that an air-to-ground attack with results such as these could have *hurt* the Allied cause, there is no way to tell how much it *helped*. However, one does not need to place one's faith solely upon the reports of pilots regarding the efficacy of their work.

The other types of report on the usefulness of Allied air action are accounts by ground forces, both Allied and German. These reports also have an interesting variety to them. Colonel E. J. Skinner, of the 162nd Brigade, Royal Field Artillery, stated, "In this

¹¹⁴ Imperial War Museum. London. 86/8/1. Stock Diary. March 22, 1918. P. 17.

area they [German aircraft] certainly completely outnumbered our aeroplanes and flew calmly low down, over all the area.” He also stated that:

There is no doubt that at this period the enemy had complete command of the air in the KEMMEL area. Their aeroplanes flew constantly over battery positions and their balloons were moved very close to the line. This was most noticeable on the 24th April.¹¹⁵

For Sergeant Morris of the King’s Light Regiment, the main feature of April 12 to April 15 was the “aerial activity by the enemy.”¹¹⁶ As well, Major Brown of the Middlesex Regiment, received “Harassing Machine Gun fire from low flying aeroplanes which caused no small amount of unpleasantness.”¹¹⁷ Finally, Major R. W. Bromms of the Royal Engineers, noted a large amount of enemy air activity as well, though he did not have the negative reaction to this that most others did:

Low flying aeroplanes... were much in evidence, but actual effect Nil. Once a squadron dropped delay action bombs on us... Result 30 or 40 deepish holes with steep sides into which the nearest sappers jumped with thanks-their work was now half done.¹¹⁸

However, negative reports due to the actions of the German air service were not the only type received.

In fact, for every account that plaintively wondered where the RFC/RAF was, another gave the RFC/RAF considerable credit for its work during the offensive. Colonel Malby Crofton, of 63 Division, stated that “One of the finest sights I saw in the war was the work of the... Flying Corps in this period... [attacking] the Boche... [with]

¹¹⁵ Public Record Office. Kew Gardens, London, England. Cab 45/125. Colonel E. J. Skinner, 162 Brigade Royal Field Artillery. April 24, 1918.

¹¹⁶ Public Record Office. Kew Gardens, London, England. Cab 45/179. Sergeant Morris, No 5 Platoon, “B” Company, 1/6th King’s Light Regiment. April 12-15, 1918.

¹¹⁷ Public Record Office. Kew Gardens, London, England. Cab 45/184. Major Brown, Middlesex Regiment. March 23-24, 1918.

¹¹⁸ *Ibid.* Major R.W. Bromms, 87 Field Company Royal Engineers, 12 Div, V Corps. April 1918. No specific date given.

M[achine] G[un] fire from our low flying aeroplanes.”¹¹⁹ Private Frederick Noakes stated that:

The enemy attacked fiercely, despite a stern resistance, during which our aeroplanes, flying only a few feet from the ground, poured machine-gun volleys into the advancing foe.¹²⁰

Brigadier J.E.S. Brind noted that the RFC was conspicuous for its ability to maintain constant air superiority over the battlefield, especially concerning keeping away German artillery spotters.¹²¹ As well, Major General Beddington, in a message to GHQ, stated, “without doubt, the concentration of [Allied] aircraft in the South [in Fifth Army’s area, at Chaulnes-Roye, as well as west of Bapaume] had frozen up the attack there temporarily.”¹²² General Salmond, head of the RFC in the field, wrote on March 26, 1918 to his predecessor Hugh Trenchard that:

Squadrons have done really magnificent work. 2nd and 1st Brigades together with 3rd Brigade were concentrated on low flying west of Bapaume. 9th Brigade and 6th Brigade concentrated in Chaulnes – Roye area. When I was at G.H.Q. tonight I heard a telephone message from Percy to Dill saying that, without doubt the concentration in the South had frozen up the attack there temporarily.

“Similarly, Cox (intelligence) told Davidson that he considered the concentration west of Bapaume had had the same effect. They were so thick over the ground that I fear some collisions occurred, but, of course, this must be put up with.”¹²³

In another letter, Salmond told Trenchard “General Goff [Gough] told G.H.Q. that the Flying Corps always pulled him out of a tight place and repeated this to the Chief at

¹¹⁹ *Ibid.* Colonel Malby Crofton, 63 Div. March 24, 1918.

¹²⁰ Quoted in Brown, Malcolm. *The Imperial War Museum Book of 1918: Year of Victory*. London : Sidgwick & Jackson in association with the Imperial War Museum, 1998. P. 64.

¹²¹ Public Record Office. Kew Gardens, London, England. Cab 45/184. Brigadier J. E. S. Brind, 3 Army.

¹²² Quoted in Travers, Tim. *How the War was won: Command and Technology in the British Army on the Western Front, 1917-1918*. London : Routledge, 1992. P. 86.

¹²³ Royal Air Force Museum. Hendon, England. MFC 76/1/92. Letter, Salmond to Trenchard, March 26, 1918.

dinner last night.”¹²⁴ Finally, even Douglas Haig commented upon the work of the RFC.

As early as March 22, he stated:

Our Flying Corps did wonders [yesterday]. They crashed 16 Enemy machines and only lost one. They too had marvellous [ground] targets, many [German] infantry on roads, horses, guns, etc. Into them they fired... and spread consternation and disorder.¹²⁵

All of the above indicate that, while the evidence is not definitive, the RFC/RAF was having a real, material effect on the battlefield. Accounts from the ground, from soldiers on the other side, would indicate this, as well, and provide an interesting contrast to the accounts of British aviators and soldiers.

From the 10th Bavarian Regiment comes an account from March 21 that “about a dozen English low-flying battle machines whizzed up and down from an incredibly low height (20 metres at most) bombed our troops advancing. This caused great confusion temporarily.”¹²⁶ Also on March 21, according to the 2nd Bavarian Regiment:

During the fog a gap had occurred between the 24th and 1st Regts.; into this the Regtl. Commander pushed his foremost line and closed it.... With improving visibility the airmen soon turned up and those of the enemy who in the most daring manner from time to time flew very low over the ground, threw down the (in)famous chain bombs, causing us thereby considerable losses.¹²⁷

According to the 66th Regiment, “The British shelled and their aeroplanes bombed and machine-gunned valley behind that hill and behind Maissemy during afternoon.”¹²⁸

¹²⁴ *Ibid.* MFC 76/1/92. Letter, Salmond to Trenchard, March 31, 1918.

¹²⁵ *The Haig Papers*. Diary. March 22, 1918.

¹²⁶ Public Record Office. Kew Gardens, London, England. Air 1/2686. Extracts from German Regimental Histories Bearing on the Effect of British Air Action During the March Offensive, 1918. 10th Bav. Regt. – 6th Bav. Div. March 21, 1918.

¹²⁷ *Ibid.* 2nd Bav. Regt. – 1st Bav. Div. March 21, 1918.

¹²⁸ *Ibid.* 66th Regt. 113th Div. March 21, 1918.

Additionally, the RFC/RAF did not slow down their pace of operations as the German attack went on. On March 22, comes an account from the 12th Grenadier Regiment:

While the III/52 and one Coy. of 12 were working through the wood, the other companies went along the south edge where they were attacked by airmen. Tribute must be paid to the way in which these airmen came down to 20 metres in order to throw their bombs and then disappeared.¹²⁹

Also on March 22 comes the account of the 76th Regiment:

The Regt. was then concentrated near Mory. It is proposed to attack Gomiecourt via Ervillers but the day is less successful than its predecessors. The attack of the 111th Div. comes to a standstill before a hitherto unknown and strong position south of Mory. Under the heavy artillery and m.g. fire and frequent attacks by air squadrons the attack cannot get on.”¹³⁰

On March 23, the 78th Regiment reported that “The fighting air squadrons of the British made themselves particularly obnoxious on this day, for they kept on throwing bombs on to the German columns and caused a great number of casualties.”¹³¹ Finally, what is certainly the most colourful example comes from Bugler Richter of No. 9 Company, 8th Grenadier Regiment, who stated that:

As we were moving forward again towards the firing line after crossing the Somme, there suddenly appeared before us some twenty British aeroplanes which dived to a height of about 100-200 metres, and then, continuing to within 2-3 metres of the ground, attacked us with their machine-guns. At first we thought they intended to land; but we speedily saw the danger, and opened a vigorous fire upon them. Several ‘Tommies’ (sic) flew so low that the wheels of their aeroplanes touched the ground. My Company commander, Lieutenant Nocke, had to fling himself flat on the ground, but for all that he was struck on the back by the wheels of one machine, thus being literally run over. Not far from me an aeroplane appeared at about one metre above the ground, making straight for me and for the moment I did not know in which direction to throw myself; the pilot appeared determined to run me over. At the last moment I was able to spring clear as the machine whizzed past me and through the firing-line. It then turned, climbed a little, and sought to

¹²⁹ *Ibid.* 12th Grenadier Regt. – 5th Div. March 22, 1918.

¹³⁰ *Ibid.* 76th Regt. 111th Div. March 22, 1918.

¹³¹ *Ibid.* 78th Regt. 19th Div. March 23, 1918.

repeat the manoeuvre; whereupon it was hit by one of the companies firing on our left and brought down. In all, five enemy machines were shot down in our Battalion's area.¹³²

Obviously, then, pilots and crew of the British air services had an effect on the battlefield. Official documents relate the quantity of work done, while personal accounts give a clear view on how the RFC/RAF's aerial actions affected German troops, at least on an individual level. It is very difficult, however, for the type of information given above to give a clear view of the *overall* effectiveness of the RFC/RAF.

For all their detail and numbers, the information given above does not contain many of the indicators necessary to judge British aerial actions in a definitive way. Number of rounds fired, number of bombs dropped and the personal accounts of British fliers, as well as both British and German soldiers, are all what have been called "adopted" indicators, rather than "required" indicators. That is, the indicators given above have been *adopted* because they are all there are, while the indicators that would be *required* to give accurate information about RFC/RAF effectiveness have not been used because they do not exist.¹³³ A postwar survey, such as that done in regards to strategic bombing, would have been impossible to do in regards to tactical bombing. As well, since aircraft cannot take ground, it would be very difficult to say, for example, "the air services stopped the Germans *here*." Adopted indicators, such as given above, are what must be used. Different interpretations of this information, however, are certainly possible.

¹³² *Ibid.* Bugler Richter. No. 9 Coy. 8th Grenadier Regt. History. 5th Div. March 24, 1918.

¹³³ The terms "required" and "adopted" indicators are taken from Thompson, James Clay. *Rolling Thunder: Understanding Policy and Program Failure*. Chapel Hill : University of North Carolina Press, 1980. P. 87. The fact that a book on strategic bombing during the Vietnam War discusses this issue is indicative of the enduring nature of this problem.

This in no way means, however, that the accounts given above are useless. Instead, they must be used carefully and conscientiously. While one cannot take accounts such as Lieutenant Stock's completely at face value, there is no doubt that he, and others like him, had an effect. If nothing else, the pilots and crew of the RFC/RAF slowed the Germans down, and that in and of itself was no mean feat. Time was as much the enemy of the German offensive as the British and French armies were; after all, the major point of the offensives was to defeat the British and French armies before American reinforcements arrived. Anything that slowed the German advance down had to be advantageous to the Allied position. By this standard, then, whatever body count Stock and other pilots and crew achieved is largely irrelevant, as far as judging the RFC/RAF's actions go.

Overall, then, it seems that the likelihood of an individual having a favourable reaction to the RFC/RAF depended greatly upon where the individual was; in some places, the RFC/RAF seemed useless, in others, the RFC/RAF did tremendous work. This is actually a good sign, as this suggests that the RFC/RAF was doing its best to concentrate its resources, instead of fighting piecemeal.

In many ways, however, it seems that this concentration happened despite the mistaken efforts of high-ranking BEF commanders to put the RFC into play piecemeal. One such officer was General Gough, who commanded Fifth Army during the German March 1918 Offensive. According to notes taken by historian James Edmonds, in a postwar interview, Gough stated:

Before the battle, he saw Charlton, his Brigade Commander, who had succeeded Longcroft, and, in conjunction with him, worked out all details for the Flying Corps. The idea was that, on the morning of the attack, all those Flying Corps people not working specifically with artillery etc., were to go up

and do low flying attacks on specified positions. One was to attack a certain section of important road and was to keep flying up and down, machine gunning everything on it. Another was to go to a definite battery position and attack the gunners with machine-gun fire. In this way *a whole front was parcelled out* so that, as soon as orders were given that the action was to begin, every Flying Corps officer knew what his job was to be.¹³⁴ [italics mine]

The experiences of the RFC in the battle of Cambrai proved the uselessness of orders that specify individual batteries and roads; the experiences of Lieutenant Lee, related in the chapter on Cambrai, showed quite clearly the impossibility of micro-managing combat to such an extent. As well, Gough's scheme gave no allowance for concentration and the superior stopping power concentration implies. It is perhaps fortunate, then, that the combination of inclement weather conditions and a fast-moving enemy limited the amount of flying done for the first few days of the offensive, or the RFC might have found itself "parcelled out," and therefore largely useless. Gough continued:

Unfortunately, on the opening day of the German push and for three days afterwards, there was intense fog in the mornings and much of the pre-arranged work could not be put in hand. As the battalions of the Fifth Army became weaker and weaker by casualties, the point was reached when it was absolutely essential for the whole weight of the Flying Corps to be thrown in the battle to help the infantry... he gave up all subsidiary work and every machine available was told, with the least suspicion of German attacks beginning, to go over and shoot up the German troops. General Gough made a particular point of this form of co-operation and thought it was of a kind to be developed in future warfare.¹³⁵

Despite the weather, however, as shown above, there were squadrons that managed to carry out air-to-ground actions during the first few days of the offensive.

¹³⁴ Public Record Office. Kew Gardens, London, England. Air 1/719/35/7. Notes on "Third Ypres" and "March Push." James Edmonds interview with Hubert Gough. April 27, 1931. P. 2.

¹³⁵ *Ibid.* P. 3.

For example, on March 25, Lieutenant Stock related that he was sent on a two aircraft “harassing” patrol in the Bapaume area.¹³⁶ Then, on March 29, Group Captain G M Klocker wrote in his diary:

O[fficer] C[ommanding] 22 Wing, Col Vesey Holt, came and spoke to all pilots. He said that the idea is that all pilots should first identify one front line and then fly up and down it at 50 feet to encourage the troops. Then they should turn East and fly up and down the Hun line at 50 feet and shoot them up, to encourage them.¹³⁷ [emphasis in original]

On March 30, Klocker wrote that he “Flew along our line at 50 feet but troops didn’t seem very interested.”¹³⁸ As well on March 30, he wrote how he got his aircraft heavily damaged while attacking one crashed Albatros and four to five German troops, who were assisting the downed German pilot.¹³⁹

These anecdotes show both how far the RFC had progressed in air-to-ground combat by this period and how far it had to go. On the one hand, the fact that Klocker was ordered to “encourage” the Germans from a height of only fifty feet indicates that the RFC was learning what it took to be effective at air-to-ground combat. This was actually a significant change from earlier work. For example, in the orders of December 22, 1917, order number nine, regarding ground targets stated:

Pilots and observers of all machines with the exception of photographic machines will at the conclusion of every flight engage ground targets with machine gun fire from altitudes not exceeding 1,000 feet. The number of rounds fired and the targets fired at will be entered in the squadron record book.¹⁴⁰

¹³⁶ Imperial War Museum. London. 86/8/1. Stock. March 25, 1918. P. 33.

¹³⁷ Imperial War Museum. London. 65/63/1-3. Klocker, Group Captain G M. March 29, 1918.

¹³⁸ *Ibid.*

¹³⁹ *Ibid.*

¹⁴⁰ Public Record Office. Kew Gardens, London, England. Air 1/1549/204/78/18. 15th Wing General Instructions No. 1. December 22, 1917.

From 1,000 feet down to fifty feet is a significant change, yet many pilots were not willing to fly even at 1,000 feet to attack ground targets unless ordered. For instance, from the No. 40 Squadron record book entry of January 19, 1918, comes the entry that three officers, Second Lieutenant Lingham, Major Miles and Second Lieutenant Bailey, “fired 600 rounds into trenches north of Bois de Biez.”¹⁴¹ One can see the necessity of orders limiting ground attacks to a height of 1,000 feet, when one realizes that the three officers mentioned above apparently attacked these trenches from a height of 9,000 feet.¹⁴² Aircraft, of course, could do little damage from that height.

In fact, even in April 1918 one can still find evidence that RAF pilots did what they could to avoid “low work.” From the Pilot’s Log of Lieutenant S. C. Joseph comes more evidence:

2/4/18: Fired 300 rounds into La Bassée from 1000 ft.
 7/4/18: Fired 100 rounds into trenches 700 ft.
 12/4/18: Dropped 4 Bombs on Loch Bac St Maur. Direct hits end of bridge.
 Fired 45 rounds 600 ft... at troops.¹⁴³

At least the height from which Joseph fired slowly lowered over time; however, forty-five rounds fired from 600 feet were still not particularly useful.

While the RFC’s growing acceptance of the necessity of “low work” actually being performed at a low altitude is encouraging, even if the refusal of some pilots to accept this necessity is not, the continuing tendency of the RFC/RAF to work towards “moral” goals was a definite negative. In the above examples, Stock was

¹⁴¹ Public Record Office. Kew Gardens, London, England. Air 1/1542/204/77/22. 40 Squadron Record Book. January 19, 1918.

¹⁴² Of course, it is entirely possible that the height given in the 40 Squadron Record Book consists of a typographical error, as 9,000 feet is a ridiculous height to fire from. Regardless, the RFC had some way to go before it could consider itself proficient at air-to-ground attacks.

¹⁴³ Imperial War Museum. London. 76/91/1. Pilot’s Log. Joseph, Lieut S C (RAF), April 2, 7, and 12, 1918.

ordered to “harass” the enemy, while Klocker was ordered to “encourage” the troops.

Even as late as August 1918, the RAF was being encouraged for its “moral” work:

The action of low flying machines on “Z” day, though it entailed heavy casualties, had a serious effect in lowering the enemy’s moral and inflicting actual losses...¹⁴⁴

There is little justification for this viewpoint. While numerous RFC/RAF memorandums focused on the importance of air superiority to infantry morale, these statements were all based upon the reaction of German troops to ground attack in 1916; after 1916 German troops were used to being attacked from the air, even if they did not like it. As well, the period of the Somme was a special circumstance because the RFC had obtained, due to superior numbers and aircraft performance, nearly complete air superiority over the Somme battlefield. That situation did not last long, nor did the grave moral consequences of harassing trench strafing attacks.

For the RFC/RAF in the Great War, the problem was not that they inflicted “moral” problems on the Germans, but instead that damage to the enemy’s morale was the major, and in some cases the *only* goal of British aerial operations. This indicates that the RFC/RAF still had much to learn about the best way to use the aerial firepower at their disposal.¹⁴⁵

During the German spring offensives, however, the effect of the continued RFC/RAF over-emphasis on moral effects was mitigated by desperation. Due to the rapid and unexpected German advance, the RFC/RAF could not wait for nebulous moral effects to wear the Germans down; instead, ground attack aircraft of the RFC/RAF were

¹⁴⁴ Public Record Office. Kew Gardens, London, England. Air 1/168/15/160/13. Letter from Henry Rawlinson to 5 Brigade, RAF, August 16, 1918.

¹⁴⁵ In many ways, this problem would hamper the effectiveness of the RAF, especially in regards to Bomber Command and strategic bombing, until the end of World War II.

forced to concentrate and inflict *material* damage on the German forces. Reality, for once, overcame theory, enabling the pilots and crew of the British air services to inflict damage upon the German ground forces to the best of their ability. The personal and official accounts and documents given earlier in this chapter demonstrated the results of these actions.

There were other problems, though, that had the potential to have a more serious effect on the performance of the RFC/RAF during this period. The major problem in this regard is that the RFC/RAF might not have had the resources to be effective as it could be, regardless of how it understood its mission.

The concept that the RFC/RAF did not have the resources to be as effective as it might have been has some justification when examined closely. By late 1917, the superiority of British manufacturing combined with the high priority given to the RFC/RAF meant that British commanders thought they would be relatively well equipped when it came to numbers of aircraft, by the spring of 1918. However, where the average monthly output for airframes and engines in 1917 was 1,289 and 980, respectively, and 2,668 and 1,841, for 1918, these numbers are deceiving.¹⁴⁶ Certainly, the output of airframes was considered satisfactory; the amount of engines produced, however, despite the increasing numbers, was a serious problem.

In fact, in January 1917 “A programme to produce 2,000 engines each month was at once laid down... but it could not be realized before, at the earliest, the autumn of

¹⁴⁶ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. “British Aircraft Produced and Labour Employed August 1914 to November 1918.” P. 154.

1917.”¹⁴⁷ Judging by the monthly averages given above, while 2,000 engines a month might have been achieved, it was only obtained well into 1918. Engine trouble, in fact, would bedevil the British air services throughout most of the war. Engines required a higher level of skilled labour to produce than did airframes, thus explaining the higher numbers of airframes produced per month, and mistakes made while attempting to obtain a standardized engine also set back the air services. While the RFC/RAF largely ironed out these problems by the spring of 1918, the British forces in the field would not see the results of these efforts until later in the year.¹⁴⁸

Manpower, while another serious issue, was not as much of a problem as some, such as Douglas Haig, have made it seem;¹⁴⁹ this is especially true for the RFC/RAF, as waiting lists to join the British air services had always been long.¹⁵⁰ The air services, in fact, had greater difficulty finding skilled mechanics to keep their aircraft running than they did pilots and observers to fly in those aircraft. In fact, on December 5, 1917, Haig stated that as far as manpower was concerned, aircraft were only second in importance to infantry.¹⁵¹ The importance of manpower reinforcements for the air services, therefore,

¹⁴⁷ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume VI*. P. 31.

¹⁴⁸ Mistakes included the ordering of large quantities of the untested Sunbeam *Arab* engine, which turned out to be a complete failure, as well as the failure of other new engines, and the failure of Lord Curzon, President of the first Air Board, to order a large quantity of older engines in late 1916. The situation was largely resolved in late 1917 with the order of 8,000 *French-made* engines as a stopgap measure. Of course, these engines took some time to produce as well. *Ibid.* Pp. 28-38.

¹⁴⁹ Haig, in fact, was in a bit of a bind as far as manpower was concerned during the German Spring Offensive. It was hard for Haig to justify his urgent need for reinforcements due to a shortage of manpower when he had for so long justified his costly offensives at the Somme and Third Ypres by talking about how well they had bitten into *German* manpower.

¹⁵⁰ Arthur Harris, the future commander of RAF Bomber Command, was told to get in line behind six thousand others when he indicated his desire to a clerk to become a pilot in the RFC. Steel, Nigel and Hart, Peter. *Tumult in the Clouds: The British Experience of the War in the Air, 1914-1918*. London: Hodder and Stoughton, 1997. P. 79. As well, the two Williams, Bishop and Barker (two of Canada’s greatest aces) both chose to join the RFC as observers, rather than endure the long wait to become pilots.

¹⁵¹ Travers, Tim. *How the War was won: Command and Technology in the British Army on the Western Front, 1917-1918*. London : Routledge, 1992. P. 37.

was one of the few priorities that Haig and his superiors back in England could actually come close to agreeing on.¹⁵²

Not only was the importance of manpower reinforcements for the air services largely agreed upon, but also major and successful efforts were made to actually get those reinforcements to where they were needed. A plan to send 15,000 American mechanics straight from the United States to British Air Service bases in France largely made up the shortfall; 10,000 of these had arrived in France by the end of March 1918.¹⁵³ This is not to say that the RAF ever reached the 100 active squadrons desired by Douglas Haig. In fact, when one takes into consideration the amalgamation of the Royal Naval Air Service squadrons into the RAF, the final number of active squadrons in the RAF equals only what Haig asked for in 1916, not his greatly expanded requests of 1917.¹⁵⁴

Differing and conflicting policies at the highest levels of command also had the potential to negatively affect the performance of the air services. According to a G.H.Q. Memorandum of January 1918, entitled "The Employment of the Royal Flying Corps in Defence", the RFC would have a variety of duties in the event of a German attack. While the most important duties were considered pre-battle and artillery observation, ground attack also made it into the document:

So far as may be possible after providing fully for the above primary duty, the Royal Flying Corps will endeavour to prevent the enemy from pressing home the full weight of his attack. The means to be employed stated in their relative order of importance are:

¹⁵² The agreement was not perfect, however. While Haig placed the air services as second on his list, the Manpower Committee of December 1917 recommended that "the fighting personnel requirements of the Royal Navy and of the Air Services should have absolute priority over all other services." Quoted in Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume VI*. P. 76.

¹⁵³ *Ibid.* Pp. 77-78.

¹⁵⁴ *Ibid.* P. 91.

- (a) Attacking the enemy's reinforcements a mile or two behind the assaulting line with low-flying aeroplanes.
- (b) Attacking the enemy's detraining and debussing points, transport on roads, artillery positions and reserves.
- (c) Sending low-flying machines, on account of their moral effect, to co-operate with the infantry in attacking the enemy's most advanced troops.¹⁵⁵

Despite the ever-present "moral effect," this is a reasonable, if overly optimistic, summary of what the RFC/RAF would do during the spring offensives. It is optimistic in that it makes the assumption of accurate intelligence, allowing aircraft to attack key rear areas, and it assumes the RFC/RAF would have the time and resources to make careful and coordinated plans. In reality, of course, what happened was that pilots were ordered to attack anything that moved within certain areas; the purpose of attacks such as those related above were material damage, not moral effect.

Where the differences in policies would come would be due to the British obsession with the offensive. In the end of the British memorandum related above, comes the statement:

The successful performance of the role of the Royal Flying Corps in defence, as outlined above, must primarily depend on its ability to gain and maintain the ascendancy in the air. This can only be done by attacking and defeating the enemy's air forces. The action of the Royal Flying Corps must, therefore, always remain essentially offensive...¹⁵⁶

In other words, all of the priorities given above, though ostensibly the highest priorities of the RFC in the event of an attack were actually subsidiary to Trenchard's "relentless and incessant offensive." This differed from French desires, expressed by Marshal Foch, on April 1, 1918:

¹⁵⁵ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. Appendix XIV. "The Employment of the Royal Flying Corps in Defence." January 1918. P. 445.

¹⁵⁶ *Ibid.* P. 446.

At the present time, the first duty of fighting aeroplanes is to assist the troops on the ground, by incessant attacks, with bombs and machine-gun, on columns, concentrations, or bivouacs. Air fighting is not to be sought except so far as necessary for the fulfilment of this duty.¹⁵⁷

Foch's directive expresses a much more realistic appreciation towards the uses of air forces; realizing that complete air superiority was an impossibility, his order forced the RAF to settle for local, temporary air superiority. That is, British aircraft would not aggressively seek out German aircraft, but instead would concentrate on their air-to-ground mission and only get involved in aerial combats if necessary. There is no mention of moral effect, as well; this fit with previous French actions, as their strategic bombing efforts, for example, had been designed purely with material effects in mind.¹⁵⁸

In most ways, however, the offensive policy pursued by the RFC had less effect on the actions of the RFC/RAF during the spring offensives than Trenchard envisioned, for the same reason that moral work was of limited effect. The situation was much too desperate, at least in the beginning of the battle, for resources to be spared for the usual offensive patrols and long-range bombing. Aircraft were needed over and near the front, not far behind enemy lines performing fighter sweeps. The orders of Marshal Foch confirmed these priorities.

Overall, the importance of the battle of Cambrai comes through clearly when examining how the RFC/RAF handled the German spring offensives. Cambrai showed, as no previous battle had, the potential effect of low-flying aircraft. In this way, then, the 1918 German Spring Offensive probably was not much of an adjustment for the RFC/RAF; instead of attacking static or retreating German forces in support of advancing

¹⁵⁷ *Ibid.* Appendix XVIII. "Orders of General Foch." April 1, 1918. P. 458.

¹⁵⁸ Williams, George K. *Biplanes and Bombsights: British Bombing in World War I*. Maxwell Air Force Base, Alabama. : Air University Press, 1999. P. 4.

British troops, they were attacking advancing German forces in support of static or retreating British troops. In fact, because the German forces were in the open, in some ways the work was certainly easier. Certainly some of the personal accounts detailed above show the potential effect of aerial operations on troops in the open. It is clear, then, that while it is impossible to exactly quantify the amount of material damage done by the British air services, and the exact results of British aerial operations are impossible to state, it is still possible to state definitively that the RFC/RAF had a positive effect on British chances during the German offensives. Certainly serious amounts of damage was done by the RFC/RAF, and serious delays were suffered by the Germans as a result of British actions, both by ground forces and by the air services. In many ways, the desperation of the situation forced the RFC/RAF to be more effective than it probably would have been otherwise; the RFC/RAF's continuing interest in moral effect and incessant offensive had to be put aside, if only temporarily. Finally, with time being one of the German's main adversaries, there is no doubt that, as costly as the actions might have been, the RFC/RAF did its part in stopping the offensives of the spring of 1918. The next major achievement would be supporting the *British* offensives of the summer and fall.

Chapter 4:
Evolutionary Sideshow:
The Royal Air Force and Ground Attack
During the British Offensives, July – November 1918

During our offensives, losses through
the action of enemy aviators have proved
extraordinarily high.¹⁵⁹

Translated German Document Regarding
Protection against Enemy Aircraft
No author.

The squadron had to be specially trained,
as it was obviously impracticable to make
a squadron which had been employed on
offensive patrols suddenly commence detailed
ground reconnaissance from a low height.¹⁶⁰

Trafford Leigh-Mallory

By the summer of 1918, the Allies were on the offensive. With their numerical and technological advantages, in many ways success in the war for the Allies was more of a question of “when,” not “if;” the Germans had shot their bolt in the spring, and could only wait and hope for the best. For the Royal Air Force, the Hundred Days were more than just the conclusion to a hard-fought, long war; instead, RAF commanders believed, the months of August to November 1918 were the proof that the British aerial services long-standing policy of all-out-offensive was the only correct way to use aerial forces.

¹⁵⁹ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. Appendix XXII. “Protection Against Enemy Aeroplanes.” July 1918. P. 113.

¹⁶⁰ Public Record Office. Kew Gardens, London, England. Air 1/2388/228/11/80. War Experiences of Trafford Leigh-Mallory. 1925. P. 15.

To put it simply, to RAF and BEF commanders, the Allied offensives had succeeded, and the German defensive strategies had failed.

In some ways, of course, these suppositions were absolutely correct. The Allies did win the war, after all. However, the fact that the Allies won does not automatically mean that all of the ideas about *why* the war was won are necessarily correct. In fact, this chapter will show that while many lessons were learnt by the British air services in regards to ground attack over the course of the war, and that these lessons were applied during the course of the Hundred Days, despite that there were still many lessons that were *not* learnt. If those unlearnt lessons had been learned, then the RAF would have been even more effective than it actually was.

Generally, by November 11, 1918, the largest problems that affected the development of the Royal Air Force were the same problems that had adversely affected its development throughout the course of the war. Despite a change of commander, the RAF still subscribed to the overall idea that the RAF's purpose was to help the army concentrate, instead of concentrating itself, as well as emphasizing the offensive, and moral effect. All of these concepts meant that the RAF was less effective than it might have otherwise been in assisting the BEF; different RAF commanders emphasizing different aspects of aerial combat might have achieved a more effective cooperation policy with the army than the incessantly and relentlessly offensive RAF actually did.

That being said, by August 1918 the RAF was a considerable concern for the German army. While this chapter intends to show that the RAF could have been *more* effective than it was, this does not mean it was not effective at all. In fact, the German army in July 1918 produced a document with the sole purpose of teaching German

soldiers how to defend against aerial attack.¹⁶¹ This document, while not conclusive, shows that air-to-ground attack was an important part of the war. Other evidence shows this as well. Overall, this chapter will show that there were two different facets to the RAF's ground attack role during the concluding period of the war. One facet, was in many ways, that of "the same, only more so." That is, ground attack was still in many ways performed by aircraft not designed for the role, in a haphazard manner, with individual aircraft looking for targets of opportunity. In this way, then, the air-to-ground operations of the RAF during the final phase of the war were merely a continuation of earlier work; personal accounts related from this period appear remarkably similar to ones given during prior periods. However, there was another aspect of RAF air-to-ground operations that was conceptually different than the usual, haphazard ground attack operations performed over the Western Front. This aspect was aircraft-tank cooperation, which involved deliberate training, liaison attempts, and ongoing efforts to improve the combined operations of the two arms. This chapter will begin with the development of air-tank cooperation in Western Europe.

If it can be said that the RAF was the most glamorous arm of the British military, then the Tank Corps was the most revolutionary. While the air services happily accepted their secondary role underneath the BEF, acting in many ways as an "aerial cavalry," the Tank Corps on the other hand did no such thing. Officers of the Tank Corps believed that, if properly used, tanks were a war-winning weapon, which would break the deadlock of the trench system and save the Allies large quantities of manpower. These

¹⁶¹ Key points within the document are the use of machine guns, lookouts and dispersal. Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. Appendix XXII. "Protection Against Enemy Aeroplanes." Pp. 113-114.

officers also had little use for the manpower-heavy offensive system of the BEF under Douglas Haig or, for that matter, Haig himself. This lack of respect for British high command reached its most extreme level in the insults directed at Haig by the tank visionary J.F.C. Fuller, whose personal diary is filled with comments on Haig such as “dull witted” and “wooden headed”, to name a few.¹⁶² While the development of the Tank Corps in and of itself is not relevant to this paper, the revolutionary attitudes expressed by Tank Corps officers certainly are, as it would be the desires of Tank Corps commanders that would force RFC/RAF commanders to pay more attention to ground attack than they would otherwise have done.

After the experiences, both good and bad, of Cambrai, it was quickly seen by the Tank Corps that for tank operations to be successful, there would have to be well thought out, detailed schemes of cooperation between aircraft and tanks.¹⁶³ As early as January 17, 1918, Tank Corps Commander Hugh Elles was asking senior RFC officials to look into “how we [the RFC] could help them [the Tank Corps] in an offensive.” More specifically, the Tank Corps was looking for help against anti-tank guns, one of which, reputedly, had knocked out a large number of tanks by itself during the Cambrai battle. Elles requested that the RFC try to determine what the most effective ways were to warn of such guns and how to keep down their fire.¹⁶⁴

Of these two requests, the latter, keeping down anti-tank guns’ fire, the RAF would be able to deal with, while the other, communicating with the tanks, would not be

¹⁶² Royal Armoured Corps Museum, Bovington. Major General J. F. C. Fuller Papers. Diary. March 2 and April 1, 1918.

¹⁶³ In fact, even before Cambrai, Sir Ivor Maxse, then commanding XVIII Corps, submitted a paper to Fifth Army regarding both the danger to tanks of anti-tank guns and the potential of aircraft to neutralize that danger. Greenhous, Brereton. “Close Support Aircraft in World War I: The Counter Anti-Tank Role.” *Aerospace Historian*. 1974, 21(2). P. 87.

¹⁶⁴ Public Record Office. Kew Gardens, London, England. Air 1/1074/204/5/1658. Letter from H.Q.R.F.C. to Brigadier-General J.F.A. Higgins, 3rd Brigade, R.F.C. January 18, 1918. P. 1.

truly solved before the end of the war. As it turned out, based on estimations of where anti-tank guns would be situated, from both captured German documents and historical precedent, such as Cambrai, anti-tank guns were relatively easy, with practice, to neutralize from the air. On February 23, 1918, experiments were carried out that indicated that field guns in the open were extremely vulnerable from both bombs and machine gun fire from the air, with the bombs damaging or destroying the guns, and the machine gun fire scattering or causing casualties among the crew.¹⁶⁵ Interestingly, these results, and the importance of aircraft dedicated to finding and neutralizing anti-tank guns seems to have been forgotten, for on August 8, 1918, the opening day of the battle of Amiens, as well as subsequent days during that offensive, large losses to tanks were caused by anti-tank guns. After the battle, Elles desperately requested aircraft from No. 8 Squadron, which since June 28 had been solely working with the Tank Corps, to dedicate some aircraft to the sole purpose of hunting down and neutralizing anti-tank guns.¹⁶⁶ This situation, unfortunate as it was, matches in many ways the expectations of the RFC in January 1918, when air-tank cooperation was first examined:

From the point of view of giving warning, a Corps machine which knows the ground intimately and can get a thoroughly good view of it would probably be better than a Scout. I explained to him [Elles] that low-flying Scouts went out to 'strafe' anything they met with in a good big area, but that Scout pilots are not trained to look for special objects at definite points.¹⁶⁷

Of course, the last half of 1918 had seen many of these "bugs" worked out. No. 8 Squadron, flying F.K.8s, and, eventually, No. 73 Squadron, flying Sopwith Camels, were

¹⁶⁵ Public Record Office. Kew Gardens, London, England. Air 1/1074/204/5/1658. Report on Aeroplane and Tank Trials. March 3, 1918.

¹⁶⁶ Public Record Office. Kew Gardens, London, England. Air 1/2388/228/11/80. War Experiences of Trafford Leigh-Mallory. P. 15.

¹⁶⁷ Public Record Office. Kew Gardens, London, England. Air 1/1074/204/5/1658. Letter from H.Q.R.F.C. to Brigadier-General J.F.A. Higgins, 3rd Brigade, R.F.C. January 18, 1918. P. 1.

dedicated to working with tanks. This seems like an interesting compromise, as the F.K.8 was a two-seat bomber/reconnaissance plane, while the Camel was a single-seat fighter. Certainly, they *did* train to know the ground they would be flying over, keep in contact with tanks, and identify and neutralize anti-tank guns. The problem in this case was that too few aircraft were given too many tasks to perform.

The nature of this is made clear by an article in the seventh supplement to the *London Gazette*, of November 8, 1918, in which Lieutenant (acting Captain) F.M.F. West was awarded the Victoria Cross for his actions of August 9, 1918:

Captain West, while engaging hostile troops at a low altitude far over enemy lines, was attacked by seven aircraft. Early in the engagement one of his legs was partially severed by an explosive bullet, and fell powerless into the controls, rendering the machine for the time unmanageable. Lifting his disabled leg, he regained control of the machine, and, although wounded in the other leg, he, with surpassing bravery and devotion to duty, manoeuvred his machine so skilfully that his observer was enabled to get several good bursts into the enemy machines, which drove them away. Captain West then, with rare courage and determination, desperately wounded as he was, brought his machine over our lines and landed safely. Exhausted by his exertions, he fainted, but on regaining consciousness insisted on writing his report.¹⁶⁸

The problem with the above account is that Captain West was performing a contact patrol, also doing air-to-ground attacks, *and* fighting off multiple enemy aircraft, all at the same time. While obviously he could not help being “bounced,” the lack of specialization, as well as the lack of an escort, either close or high, shows that in the RAF, the more some things changed, the more they stayed the same.

However, for the pilots and crew of No. 8 and No. 73 Squadrons, things could change, as they were under the direct control of the Tank Corps. This meant that when Elles asked for aircraft dedicated to anti-tank gun missions, Elles got exactly that, thus helping to reduce future tank casualties.

¹⁶⁸ *The London Gazette*, Seventh Supplement. November 8, 1918.

In fact, it was not only No. 8 and No. 73 Squadrons that received orders to focus their attention on anti-tank guns. The GOC of 5th Brigade, Brigadier-General L. Charlton sent out a memorandum to his brigade on August 14, 1918, stating:

All experience since the opening of the battle goes to prove the controlling action taken by the Anti-Tank guns of the enemy. Single guns have been responsible for 'knocking out' as many as 8 tanks in succession and thus completely holding up the advance in the sector concerned.

It is not too much to say that without the Anti-Tank gun the advance of our line would be irresistible.

The importance therefore of offensive action on the part of pilots and observers against these guns becomes of paramount importance and no opportunity should be missed; ground in front of the tank advance should be watched for their appearance and for their flashes, and it will be seldom that the duty in which machines are at the moment engaged will not yield in importance to offensive action at once against the Anti-Tank gun.¹⁶⁹

Including No. 8 Squadron, there were seventeen squadrons affected by this order, with an established strength on August 8, 1918 of 332 aircraft.¹⁷⁰ Aircraft-tank cooperation, then, was of the highest importance; only one of those seventeen squadrons, however, had ever worked and trained extensively with tanks.

Even when the theory and practice were worked out, however, this did not mean things would go as planned. One of the largest and most pervasive problems, of course, was the weather. Attacks went ahead whether or not it was possible for the RAF to carry out its missions; thus, tanks that were supposed to be supported by aircraft were left exposed, sometimes at exactly the wrong time, as the writings of then-Major Trafford Leigh-Mallory, No. 8 Squadron Commander, attest:

¹⁶⁹ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. Appendix XXV. "The Battle of Amiens." P. 123.

¹⁷⁰ *Ibid.* Appendix XXIV. "Order of Battle of the Royal Air Force, France, on 8th August 1918." Pp. 119-120. What the actual strength of these squadrons was by this point is impossible to say. While losses were certainly heavy (No. 8 Squadron had a fifty percent casualty rate for the first two days of the offensive), replacements were also coming in at a fast rate. Public Record Office. Kew Gardens, London, England. Air 1/725/97/10. *History of Tank and Aeroplane Co-operation*. P. 6.

August 21st was quite the most disappointing day's work the Squadron had with the Tanks... The morning was very foggy indeed, and it was quite impossible for the machines to leave the ground till 11.0 a.m., zero hour having been at 4.55 a.m. As so often happens on such days, the fog lifted suddenly, and so, whereas it was quite impossible one minute, and looked thicker than ever, 5 minutes later it had lifted. The wind being in the East, the fog had cleared on the German side of the line first, thus allowing their aeroplanes to fly on the line unmolested for an hour or so. Also, just as the fog lifted, our Tanks, especially Whippets, were just approaching the ACHIET LE GRAND railway, thus presenting a magnificent target to the isolated German anti-tank guns situated on the railway embankment, which immediately opened fire scoring many direct hits on our tanks. As this was just one of the places which had been selected for special attention on the part of the anti-tank gun machines, the tanks might have been saved a great number of casualties, had it been possible for our machines to be there.¹⁷¹

On August 23, however, things went quite differently, even though the plan of action for No. 8 Squadron was exactly the same as on August 21. With the weather cooperating, No. 8 and No. 73 Squadrons were able to provide constant cover for the tanks, with the two squadrons dropping 225 bombs and firing over 31,000 rounds of ammunition. According to Leigh-Mallory, "The anti-tank gun work on this day was most successful throughout."¹⁷²

It is quite apparent, then, that with proper training and orders, such as those ordering all aircraft to target anti-tank guns, tanks and aircraft made a very effective team. However, as mentioned above, there was one problem that was never solved throughout the war. This was the problem of communication.

In many ways, the question of communication was the most important question faced during World War I. For the British air services, the need for good communications was seen even before the war began, as British reconnaissance aircraft in prewar exercises tried various ways to give the information they had gathered to the

¹⁷¹ *Ibid.* P. 9.

¹⁷² *Ibid.* P. 10.

right person. After reconnaissance, aerial artillery observation was the next test of aerial communication abilities, though in this case there was as much a problem getting the recipient of the information to believe it, as there was in imparting the information. Air-to-ground wireless communicators would prove to be the solution to reconnaissance and artillery observation communication difficulties. In air-to-air combat, communication was also important. This, however, was solved by the simple expedient of streamers and hand signals.¹⁷³

Finally, and most importantly for this paper, was the problem of air-to-ground battlefield communications. Contact patrols were designed to help keep higher-ranking officers in contact with the infantry, and it was from contact patrol aircraft that the concept of “low work” and “trench strafing” largely originated. It was from the concept of contact patrols, as well, that the idea of tank-aircraft liaison work originated. The work performed by No. 8 and No. 73 Squadrons was largely a specialized version of earlier infantry contact patrol work; instead of machine gun nests, however, tank contact patrols were concerned with anti-tank guns. Of course, for both types of contact patrols, communication was a continuous problem.

While the problem of air-to-ground communications existed throughout the war, it did not become important to ground attack aircraft until the final British offensives of 1918, apart from the Cambrai battle of November 1917. The reason for this is two-fold. The first is that ground attack before Cambrai was a haphazard business, done at random, with few results expected, while the second is that the other major opportunity for low

¹⁷³ Streamers were attached to the aircraft of the flight commander and the second-in-command, to expedite the identification of those aircraft. Within two-seat aircraft, communication in a noisy environment was solved by the simple expedient of one crewman clouting the other on the side of the head to get his attention, and then yelling or pointing out whatever was appropriate to the situation.

work, the 1918 German spring offensives, were such desperate affairs that there was no chance for coordination.

As the first chapter of this thesis shows, while there were attempts to create organized air-to-ground attacks that coincided with ground offensives, there was little thought as to how, specifically, to coordinate the two effectively. This changed at Cambrai, with certain squadrons dedicated to air-to-ground work, and assigned specific targets and areas of responsibility. Even during Cambrai, however, there were few attempts at coordination; Cambrai only brought the realization, mostly to the Tank Corps, that effective air-to-ground communication was vital to any successful tank action.

As a result, beginning in January 1918, various air-tank cooperation experiments were conducted, with varying degrees of success. Unfortunately, the results of these experiments would not undergo the test of battle until the summer of 1918, due to the short-term success of the German spring offensives. Due to the success of the German offensives, aircraft were merely thrown into the battle in large numbers and told to attack any Germans they found. While in many ways these tactics of desperation were successful, obviously this was not the ideal arena for developing sophisticated air-to-ground liaison tactics.

Before the offensives, and after them, however, there were various attempts at air-tank communication, as stated above. These experiments included visual signals such as flares and long paddles attached to aircraft, wireless radio and wireless telegraphy. Of these methods, only wireless telegraphy was viable. During one test, the aircraft involved was able to successfully guide the tank involved in the test around several potential

obstacles, thus increasing the potential efficiency of air-tank operations dramatically.¹⁷⁴ Unfortunately, this was not determined until June 1918; by this point, there was such a backlog of orders for this type of equipment that tanks would not get any until after the end of the war. In many ways, air-tank communication was a problem that was never solved.

To compensate for this, detailed pre-battle plans were devised and used. The most important examples of this come from the detailed anti-tank gun work done by aircraft. Using the example of Flesquières Ridge, from the battle of Cambrai, where one artillery piece, over open sights, supposedly knocked out nearly ten tanks, dedicated anti-tank gun squadrons in liaison with tank officers pinpointed the most likely hiding places for anti-tank guns. They then concentrated on those points, thereby largely allowing the aircraft to ignore the problem of communicating with the tanks under their protection. The results of this sort of detailed planning can be seen in the account given above of August 23, 1918, where aircraft were extremely successful at neutralizing anti-tank guns and protecting their charges.

This type of detailed planning, and the results that could be expected from it, shows best how far the RAF had advanced since the early days of air-to-ground combat. Instead of haphazard trench strafing, as happened before November 1917, or the desperate work of the spring 1918, the work of the offensives of the summer of 1918 consisted of a methodical, well-planned combined arms approach to battle. As well, the scale of the work was increasing, as the quantity of aircraft dedicated to low work

¹⁷⁴ Public Record Office. Kew Gardens, London, England. Air 1/688/21/20/8. No. 8 Squadron History. P. 23.

increased. Perhaps the best example as to how large the RAF had grown comes not from air-tank cooperation, but from a different type of ground attack.

On June 2, 1917, Canadian pilot "Billy" Bishop attacked an unidentified German aerodrome, thus beginning a trend that would continue to the end of the war. On August 13, 1918, Sopwith Camel pilot Eric Crundall wrote in his diary of the large-scale aerodrome raid he had been a part of, and how successful it was.¹⁷⁵ On August 16, 1918, this trend achieved what would be perhaps its ultimate expression, in a raid on Habourdain Aerodrome. The raid was discussed afterwards by its planner, Lieutenant Colonel Curtis Strange of 80th Wing, RAF:

We decided to tickle our opposite numbers up by a raid on Habourdain Aerodrome in which the whole wing was to take part... We started off in squadrons independently, but formed up as follows over our rendezvous... 4th Squadron, AFC with Snipes from 7,000 feet to 8,000 feet; 88 Squadron with Bristol Fighters at 6,000 feet; 46 Squadron with Camels at 4,000 feet; 2nd Squadron, AFC with SE5s at 3,000 feet and 103 Squadron with DH9s at 2,000 feet... I made it clear that no time was to be wasted and that all our energies were to be concentrated solely on the objectives of the raid, for I know how tempting some targets look to a squadron that is flying low down... My chief impressions of the show were a perfect mass of Archie's bursts, which took no effect at all, as none of their gunners seemed to get the range of our height, a certain number of German aircraft tearing back from the lines ahead of us, and a few of their scouts above and around us that dared not interfere. Then came the Very light signal, fired by Captain Cobby in the van of No. 4, AFC, and the inspiring spectacle of that squadron diving down to their mark- right down till they seemed mere specks that spat streams of tracer bullets and left bursts of their bombs here, there, and everywhere about the hangars. Then would come a burst of black smoke from first one hangar and then another, as the petrol inside their machines ignited. A Fokker biplane was caught in the air under this Squadron, as luck would have it, and flew straight into a tree. Then down went the SE5s of No. 2 A.F.C.¹⁷⁶

A description of what the raid was like to someone in one of the squadrons involved comes from Lieutenant Frank Roberts, of the No. 2 Squadron, Australian Flying Corps:

¹⁷⁵ Crundall, Eric D. *Fighter Pilot on the Western Front*. London: Kimber, 1975. P. 140.

¹⁷⁶ Quoted in Steel, Nigel and Hart, Peter. *Tumult in the Clouds: The British Experience of the War in the Air, 1914-1918*. London: Hodder and Stoughton, 1997. P. 339.

We went straight in and as far as the SE5s were concerned our fellows carried six 25 pounder phosphor bombs and six 25 pounder Cooper high-explosive bombs. The phosphor bombs were horrible damn things when they burst, if you got any of that on you then you burnt. The Huns got all their aircraft in the air if they could but they didn't have much to come home to afterwards!¹⁷⁷

In a little over a year, aerodrome raids had changed from solo affairs, such as those performed by Bishop, as well as Lieutenant Maybery, both discussed in chapter one, to unstoppable attacks that involved entire wings of the RAF. Of course, by this point had the RAF grown in size substantially, and additionally the German Air Force, while not wiped out by any means, was only a shadow of its former self. In fact, over the course of the war, the Allied air forces had numerical superiority over the German air force in almost every case (one of the few exceptions was over the battlefields of the 1918 spring offensives). By the end of the war, including the Independent Force under Hugh Trenchard, the RAF had 99 squadrons in France, of which 38 were single-seat fighter squadrons. This represented a total 1,799 aircraft, of which 1,576 were considered serviceable. Of the 1,799 aircraft, 747 were single-seat fighters.¹⁷⁸ In contrast, the Germans had over 2,700 aircraft on November 11, 1918.¹⁷⁹ Unfortunately for the Germans, while these numbers seem good, the German air force also had the French air service to deal with, as well as the rapidly expanding American air service. By November 11, 1918 there were 45 American squadrons over the Western Front,

¹⁷⁷ *Ibid.* Pp. 339-340.

¹⁷⁸ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. Appendix XXVI. "Strength of the Royal Air Force, Western Front (Including Independent Force and 5th Group), 11th Nov. 1918." Pp. 128-129.

¹⁷⁹ Morrow, John Howard. *German Air Power in World War I*. Lincoln, Neb.: University of Nebraska Press, 1918. P. 140.

consisting of 740 aircraft;¹⁸⁰ as of June 1918, there were 3,149 French aircraft in Western Europe, as well.¹⁸¹ In total, then, not counting smaller air services like the Belgian air service, the Allies possessed over double the number of aircraft the Germans had available by the end of the war. It is no wonder, then, that the RAF was able to concentrate heavily during the latter stages of the war, when they wished to do so. The increasing numerical preponderance of the RAF, combined with the lessons learned in past air-to-ground combats, ensured that the RAF would be more effective at ground attack as the war went on.

As stated in the introduction to this chapter, however, this does not mean that the RAF could not have performed better than they did. For instance, while No. 8 Squadron was dedicated to air-tank cooperation, a positive step, with eventually No. 73 Squadron joining No. 8 Squadron, during the final part of the war there was still one squadron, No. 6 Squadron, that was dedicated to the Cavalry Corps.¹⁸² One wonders what that particular squadron did with its time. As well, despite the Allied preponderance of aircraft and pilots, the Germans sometimes achieved *local* air superiority, even though altogether they were greatly outnumbered. For example, in mid-July 1918, the commander of the 5th Brigade, RAF, while talking to the commander of the No. 27 Pursuit Squadron, American, stated

“We are moving out of here in the morning,” he said. “We have suffered losses worse than you will ever know. You probably heard that big German

¹⁸⁰ Maurer, Maurer, ed. *The U.S. Air Service in World War I*. Washington: The Office of Air Force History, 1978-1979. P. 17.

¹⁸¹ While these numbers are for June 1918, in all likelihood, like all the other Allied air services, total French aircraft numbers went up as 1918 went along. Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Appendices*. Appendix XL. “Strength of Allied Aircraft on All Fronts: June 1918.” Separate chart.

¹⁸² *Ibid.* Appendix XXIV. “Order of Battle of the Royal Air Force, France, on 8th August 1918.” P. 119.

ammunition dump exploding all day yesterday. Well, it cost us dozens of pilots and dozens of planes to get it. One outfit alone lost fifty per cent of its flyers. I hate to leave you chaps here. The enemy now outnumber us *in this salient* three to one. When we pull out they'll outnumber you at least six to one."¹⁸³ [italics mine]

This is not the only indicator that the RAF, even well into 1918, did not concentrate its resources as it might have. Wing Commander Sir John Slessor calculated that the German air service concentrated 57% of its combat aircraft allocated to the Western Front for the spring offensives. The RAF, on the other hand, only concentrated 47% of its combat aircraft for the battle of Amiens.¹⁸⁴ This lack of concentration could only have had a negative effect on the RAF's efficiency, including its efficiency in performing ground attack.

In fact, one gets the sense overall that low work was still, at best, secondary to both artillery observation and the RAF's continuing aerial offensive. With the exception of certain dedicated squadrons, such as No. 8 and No. 73 Squadrons, ground attack in the later parts of 1918 still seemed to be something that single-seat fighter squadrons did, but only when they were not assigned to the all-important high Offensive Patrol. As well, the lack of dedicated ground attack aircraft, as indicated in the above section on the Cambrai battle, also indicated the lack of forethought and importance assigned to ground attack by the higher echelons of the RAF. This would continue, as well, with most post-war strategic thought being dedicated to the strategic offensive, with any thoughts towards

¹⁸³ Quoted in Hartney, Harold E. *Up and at 'em*. New York: Arno Press, 1980. Pp. 186-187. Strangely, Hartney, who fought in the RFC until his wounding in February 1917 at the hands of Manfred von Richthofen, was originally Canadian. He changed his citizenship to American in late-1917 in order to take command of No. 27 Squadron. Pp. 102-103.

¹⁸⁴ Slessor, John Cotesworth. *Air Power and Armies*. London: Oxford University Press, 1936. P. 184.

ground attack being dismissed with a quick reminder of the thirty-percent casualties sustained during Cambrai.¹⁸⁵

Most damningly, when one examines the individual accounts of ground attack operations during the last part of the war, one can see little difference from earlier accounts. For example, on August 8, 1918, from a pilot of No. 84 Squadron comes the account that:

As soon as the fog showed signs of lifting the trail of S.E.5s began. Each was loaded up with the customary four 25 lb. bombs and amply supplied with ammunition for low bombing and the attack of ground targets. The squadron kept up a continuous patrol the whole day from 8.30 a.m. to 8.45 p.m. Troops and transport were freely peppered with bombs and shot up with machine gun fire. Captain W.A. Southey got a direct hit on a wagon in the course of the first patrol. Lieutenant N.W.R. Mawle, who left at 9.45 a.m., sighted two enemy balloons... Next he turned north and sighted an anti-tank gun. He dived, opened fire, and the gun was observed to limber up and move east along the Amiens – Villers – Bretonneux road. He returned again and the horses were scattered and the gun was observed to topple over into a ditch at the side of the road. He next turned his attention to a party of retreating Germans, opening fire on them and causing casualties. He then gained height and dived on enemy trenches containing machine-gun emplacements. He was next seen by Lieutenants A.C. Lobley and J.E. Boudin (U.S.A.S.), who reported the above, flying west. Mawle finally reached the aerodrome having been wounded in the stomach and arm by machine-gun fire.¹⁸⁶

Another useful account comes from the combat report of another pilot of No. 84

Squadron, Captain W. A. Beauchamp Proctor, who reported on September 5, 1918, that:

I saw some infantry advancing and a Hun machine gun team waiting for them in a sunken road. I immediately dived on the team, and my flight followed. After two dives I could not see any more of the machine gun crew alive. I now flew round our infantry detachment at about 20 feet off the ground, and saw them wave and then point towards some trenches. I flew in the direction pointed, but could not see any Huns ! so I again flew round our infantry. They continued to point at the trenches, so I dived down to about 10 feet at the trenches, whereupon about 30 Huns attempted to get out of the trench.

¹⁸⁵ Kennett, Lee. *The First Air War, 1914-1918*. New York: Free Press, 1991. P. 221. Also Wise, S. F. *Canadian Airmen and the First World War*. Toronto: University of Toronto Press, 1980. Pp. 575-576.

¹⁸⁶ Imperial War Museum. London. P. 247. Captain E. R. Pennell, No. 84 Squadron (Australian), RAF. P. 32.

They had evidently been hiding in a dug-out. Lieut. Corse (U.S.A.S.), Capt. Carruthers and myself continued to shoot into these Huns until there were about 5 left, and these I saw were being engaged by the Lewis Gun carried by our infantry detachment. Besides the above Huns, we engaged several small machine gun nests, and caused them to abandon their guns, and become easy prisoners for our infantry.¹⁸⁷

What is most interesting about both of these accounts was not the heroic work done by each of the pilots, but instead the *number* of aircraft involved. Lieutenant Mawle's work of August 8, for example, was a solo effort, while Captain Beauchamp Proctor's work involved a comparatively stronger three aircraft. Even three aircraft, however, was not the same as the German system, which involved large numbers of dedicated battle flights overwhelming key areas. Even the reports of No. 8 Squadron, which was dedicated to tank cooperation, indicates that air-to-ground forces were spread much too thin. For example, during the battle of Hamel, on July 4, 1918, the entire 5th Brigade, Tank Corps, had one flight dedicated to it. The same ratio was observed at Amiens, on August 8, 1918 as well.¹⁸⁸ Roughly, this meant there were four aircraft for every thirty tanks. Considering the importance of close air support to successful tank operations, one wonders if a higher ratio of aircraft to tanks might have not been more effective. The small number of aircraft involved in battlefield low work is even more apparent when the numbers are compared to the wing-size aerodrome raids described above.

Another aspect of ground attack that did not change throughout the course of the war was the casualties and mental strain that ensued because of it. Lieutenant Elliot Springs of No. 85 Squadron, which by August 1918 was performing a large number of ground attacks, wrote on August 27, 1918 that:

¹⁸⁷ *Ibid.* P. 37.

¹⁸⁸ Public Record Office. Kew Gardens, London, England. Air 1/725/97/10. "History of Tank and Aeroplane Co-operation." Pp. 1-3.

We've lost a lot of good men. It's only a matter of time until we all get it. I'm all shot to pieces. I only hope I can stick it. I don't want to quit. My nerves are all gone and I can't stop. I've lived beyond my time already. Here I am 24 years old, I look 40 and feel 90.¹⁸⁹

While Springs would survive the war, many of his compatriots would not. One of those who did not survive was Lieutenant J.M. Grider, also of No. 85 Squadron. In his diary entry of August 11, 1918, he wrote, "Yesterday we did ground strafing [*sic*] down south. That's my idea of a rotten way to pass the time."¹⁹⁰ As well, as has already been stated, squadrons dedicated to low work during the battle of Cambrai took 30% casualties per day. The August casualties of No. 8 Squadron were heavy as well, with No. 8 Squadron taking nearly 50% casualties during the first two days of the battle of Amiens. Additionally, No. 80 Squadron, which performed large amounts of low work from March 1918 until the end of the war, averaged 75% casualties per month during this period. Of these casualties, slightly less than half were killed.¹⁹¹

Of course, one must remember that in this case, as in many others before it, the RAF learned some lessons, even if it took the harsh training ground of combat to learn. As indicated above, by the middle of August, instead of one or two squadrons being dedicated to air-tank cooperation, an entire brigade was, *and* the entire brigade was ordered to focus on anti-tank gun work. This shows improvement. However, with the exception of No. 8 and No. 73 Squadrons, there was no specific air-tank cooperation training for the squadrons of 5th Brigade; despite the protests of No. 8 Squadron Commander Trafford Leigh-Mallory "squadron[s] which had been employed on

¹⁸⁹ Quoted in Bickers, Richard Townshend. *The First Great Air War*. London, Sydney, Auckland, Toronto: Hodder & Stoughton, 1988. P. 246.

¹⁹⁰ Grider, J. M. *War Birds: Diary of an Unknown Aviator*. New York: George H. Doran Company, 1926. P. 244. Grider was shot down and killed in either late-August or early-September 1918.

¹⁹¹ Slessor, John Cotesworth. *Air Power and Armies*. London: Oxford University Press, 1936. P. 100.

offensive patrols suddenly commence[d] detailed ground reconnaissance from a low height.” Even No. 73 Squadron, which was a dedicated air-tank liaison squadron, was not assigned to that task until mid-August 1918. Most likely, the improvements shown by the RAF had, as already indicated, more to do with increasing numbers of RAF aircraft than with any deliberate attempt to make the RAF’s ground attack efforts more efficient.

Overall, operations for the RAF during the final period of the war seem in many ways like a case of “the more things change, the more they stay the same.” While air-to-ground combat grew more effective as the war went on, this was largely due to the constant expansion of the RAF. While there was some training, specifically with tanks, and, in some ways more importantly, effective pre-battle planning, that helped allow No. 8 and No. 73 Squadrons, along with, eventually, the rest of 5th Brigade, to become more effective in their battlefield support, many important lessons never seemed to be learned. The RAF never concentrated its resources the way it could have, instead dedicating too much energy to the panacea of “moral effects” and high offensive patrols. The large-scale aerodrome raids and fighter sweeps that the RAF performed make the small number of dedicated ground attack aircraft stand out even more than they would otherwise. The RAF gave credit to its offensive doctrine for the unwillingness of German aircraft to come up and fight a large percentage of the time; in some ways this was correct, for even though the RFC/RAF took greater casualties than the German air service did, the Germans could afford those casualties less. However, the fact that the Allies had a two to one advantage in aircraft over the Germans on the Western Front had more to do with Allied industrial capacity than it did the RAF’s policy of incessant offensive.

Conclusion:
Still Evolving:
British Air Services and Ground Attack
At the End of the First World War

The RFC/RAF was remarkably uniform in its tendencies, despite having three different commanders in France during the course of the war: Henderson, Trenchard and Salmond. As has been shown in this thesis, the major trends that affected RFC/RAF operations during the war were the emphasis on “moral effect” and the obsession with offensive actions. While the effects these ideas had on ground attack operations varied over time, nevertheless they were there. As well, these concepts, especially that of the incessant and relentless offensive, matched perfectly the goals of the BEF under Douglas Haig. The close match of ideas, combined with the indispensability of artillery observation, helped the various heads of the RFC/RAF have an extremely close and amicable working relationship with Douglas Haig.

This close working relationship came at a cost, however. The accepted and successful desire that the air services do nothing but support the BEF meant that revolutionary ideas were slow in coming, if they came at all. Unlike the Tank Corps, which was revolutionary in its thinking, and often at odds with GHQ, the air services were constantly trying to play catch-up; instead of systematic thinking about different ways to use aircraft, most RFC/RAF combat innovations came from individuals at the bottom, and slowly worked their way up.

This was as true with air-to-ground combat as it was with anything else. The first ground attacks occurred as early as 1914, when individual pilots dropped small bombs on troops of cavalry and infantry on the move. After that, pilots and observers took bombs

with them on “contact patrols” and took any random chance that came their way to strafe and bomb the enemy. Only by 1916 had these actions received official sanction; during the Somme, all aircraft performing contact patrols were ordered to carry bombs and attack targets of opportunity. It is no coincidence that the first records of rounds fired during ground attacks were kept during July 1916. These actions were only officially sanctioned harassments, however; raids against towns and, especially, train stations, were the most organized and materially destructive of air-to-ground work at this time.

By 1917, however, the concept of using aircraft in direct support of British offensives had come into being; of these, perhaps the most notable were the operations during Arras, and the overnight fitting of bomb racks to single-seat fighters for the beginning of Third Ypres. These supporting actions, however, were small scale, and only gave a hint of what was to come. The first major ground attack campaign came in November 1917, during the battle of Cambrai. For the first time, squadrons were specifically trained for the purpose of ground attack, and scout squadrons consisting of Sopwith Camels were designated for “low work,” with specific areas of work and, in some cases, individual targets.¹⁹² For the pilots so designated, low work was a shocking change from the high Offensive Patrols that had been their major duties before this point. While effective, especially considering that this was the first time that low work had been done on a sustained basis, the actions of the squadrons dedicated to low work were also costly. Each squadron involved in ground attack took 30% casualties per day. This

¹⁹² It is difficult to tell the origins of this training. All Maurice Baring, Trenchard’s aide, for example, had to say about it was “Preparations are now being made with the utmost secrecy for the big Tank attack. We none of us had any idea of these preparations, and the moves of the Squadrons were made in such a way that they thought until the last minute that quite different purposes were being aimed at.” Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930. P. 254. Most likely the planning came from the army level, in this case General Byng.

heavy loss ratio would stay roughly the same throughout the course of the war, and afterwards would be used as justification for the RAF not being involved in air-to-ground combat at all.

In fact, there is some indication that the RFC wished not to do low work even while the war was going on. In a January 1918 memorandum regarding possible RFC actions during a German offensive, ground attack is only given fourth importance, after reconnaissance, artillery observation, and *offensive fighter sweeps*.¹⁹³ These priorities show how much the realities of combat were resisted in favour of the offensive ideology of the time. What actually happened during the spring offensives, of course, was that low work took priority over everything but artillery observation; additionally, to even bring artillery observation into the equation is deceptive, for the aircraft that did the majority of low work, single-seat fighters, were not equipped to perform artillery observation, having no observer or wireless.¹⁹⁴ As well, training for ground attack was at best sporadic, at worst non-existent. This too would carry on until the end of the war, and indicate the lack of importance of low work to RFC/RAF thinking.

Finally, during the last half of 1918, and the Allied offensives, the RAF performed more and more low work, whether it wanted to or not. While the work performed was certainly useful, especially for the Tank Corps, low work was still a distant priority in the overall RAF scheme of things. High Offensive Patrols and, with the creation of the Independent Force, strategic bombing, were the darlings of Trenchard

¹⁹³ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. Appendix XIV. "The Employment of the Royal Flying Corps in Defence." January 16, 1918. Pp 444-445.

¹⁹⁴ While Bristol Fighters, which were two-seat aircraft, were heavily involved in ground attack during the 1918 Spring Offensives, they were not at all intended for artillery cooperation duties.

and Salmond, who still insisted that offensive actions were the only proper use for aircraft, no matter how ineffective those offensive actions might be. While the amount of low work done was growing all the time, this was due more to the growth of the RAF as whole rather than to any extra emphasis on air-to-ground combat. The fact that the ratio of aircraft to tanks for No. 8 Squadron was one flight of aircraft per brigade of tanks indicates this as well, as does the fact that only two squadrons, No. 8 and No. 73, were dedicated tank cooperation squadrons. Indeed, by the time of the Amiens battle, in early August 1918, No. 8 was still the only dedicated tank cooperation squadron, but there was still a squadron dedicated solely to the Cavalry Corps. Change, and the recognition of the importance of ground attack, came slowly, when it came at all.

Overall, then, RFC/RAF ground attack was important and in some cases crucial to the war on the ground. While the evolution of ground attack was a haphazard affair with many false starts, like the inability of the British to produce a dedicated ground attack aircraft, it grew in importance as the war went on. Certainly, the RFC/RAF was given credit for stopping some parts of the German offensives in the spring of 1918; considering the situation at the time, even if the RFC/RAF only slowed down a German offensive, that meant invaluable work was done. As well, when used properly, aircraft were a valuable part of the combined arms offensives of the latter part of the war.

That being said, it is the conclusion of this thesis that aircraft could have been used much more effectively in a ground attack role than they actually were. The continued emphasis throughout the war on offensive actions and moral effect limited the effectiveness of the air services. While those theorems had little direct effect on RFC/RAF actions during the 1918 German offensives, since that period was so desperate

that it forced the British to throw everything available into the fray, whether it wanted to or not, it certainly impacted the effectiveness of the RAF during the final stage of the war.¹⁹⁵ Despite the preponderance of Allied aircraft, or perhaps because of it, the British spread aircraft around like butter, causing damage in little pieces, if at all, and never causing the knockout blow they were so desperately looking for. In the end, while the air services did good low work, firing over ten million rounds at ground targets between July 1916 and November 1918,¹⁹⁶ and helped develop a form of aerial attack that would be of extreme importance in later wars, the theories that drove the air services prevented them from accomplishing as much as they could and should have done.

Of course, one must not take the relative importance of ground attack out of context; the RFC/RAF had many missions, several of them more important than ground attack. The first on that list would have to be artillery spotting; despite the rapid technological growth and expansion of the air services, it was artillery that was the primary weapon of the British forces. Helping the artillery had to be the RFC/RAF's first priority. When one wonders if the RFC/RAF could not have allocated more resources to ground attack, one must take into consideration the necessity that resources not be allocated *away* from artillery spotting.

¹⁹⁵ This is shown by the changes in aircraft strength between March 21, 1918 and March 31, 1918. For III and V Brigades, as well as 9th Wing, all of which were on the main battlefront, single-seat fighter strength changed from 261 aircraft to 341 aircraft, a gain of 80 aircraft. For corps reconnaissance aircraft, however, the numbers changed from 168 aircraft to 141 aircraft, a loss of 27. For the RFC as a whole, however, single-seat fighter numbers changed from 536 aircraft to 534 aircraft, a loss of two, while corps reconnaissance aircraft changed from 375 to 348 aircraft, again a loss of 27. Obviously, the front of the German attack was considered an important place for single-seat fighters to be, thus showing the importance of ground attack as well. Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. Appendix XVI. "Comparative Table of Changes in Strength of British and German Air Services during the German Somme Offensive 1918." January 16, 1918. P. 451, *after*.

¹⁹⁶ No author. *Synopsis of British Air Effort During the War*. London: His Majesty's Stationery Office, 1919. P. 18.

However, as has been shown in this thesis that was never a problem for the RFC/RAF. Even during the worst days of the German spring offensive, artillery squadrons did not deviate from their primary mission; for the most part, the only change for artillery cooperation squadrons was in the number of missions performed, not in the nature of those missions.

Inherently, if artillery cooperation missions were important, then protecting those aircraft was important as well. Another mission that would have higher priority than ground attack, then, would be the protection of spotting aircraft. This would directly affect the number of aircraft available for ground attack, as the single-seat fighters used for escort purposes were the same aircraft used for ground attack.

Reconnaissance was another mission that was given higher priority than ground attack. To effectively counter an enemy offensive, knowledge of the enemy's movements was important, to say the least. Aerial reconnaissance, both near and far past the lines, was by far the best way to gain the information army commanders so desperately needed. This mission, too, could directly impact the number of aircraft available for ground attack, for even if two-seat aircraft were used for reconnaissance missions, single-seat fighters were necessary for escort.

However, after reconnaissance, artillery spotting and escorts for the artillery spotters, one would think that ground attack could be the next priority. This, however, was not the case, as indicated earlier, even during periods where one would suspect it would be, such as the German spring offensives. In a memorandum issued by G.H.Q. in January 1918 entitled "The Employment of the Royal Flying Corps in Defence," the priorities given were:

(a) Co-operation with our artillery, the activity of which will probably be increased at this stage.

(b) Extensive bombing attacks, to hinder the enemy's preparations, inflict casualties upon his troops and disturb their rest.

(c) *An energetic offensive against the enemy's aviation in order to permit of [sic] (a) and (b).*

Information will also continue to be of vital importance to all Commanders.¹⁹⁷ [*Italics mine*]

In other words, even though ground attack was ostensibly secondary only to artillery spotting, in reality it was superseded by the all-important offensive sweep.

Pilots, of course, appreciated the emphasis on offensive patrols. Not only was air-to-air work considerably more glamorous than ground attack, but it was also safer; casualties for ground attack squadrons were much higher than they were for squadrons doing offensive sweeps. One must remember, however, that a large part of that feeling of safety came from the pace of offensive fighter patrols; the hours flown, and therefore the casualties, went at a much faster rate during major battles than they did during more relaxed periods when offensive patrols were the norm. As well, the trouble with judging the British addiction towards offensive patrols is emphasized by the nebulous nature of victory claims.

Inherently, British losses were largely accurate; there was no way, for example, that British squadron commanders could, or would, hide the knowledge that one of their pilots had not made it back to base. German losses, on the other hand, could only be estimated. While it is common knowledge now that the German air service had more victories than the British air services did, this was not known at the time. In fact, exactly

¹⁹⁷ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume IV*. Appendix XIV. "The Employment of the Royal Flying Corps in Defence." January 16, 1918. Pp 444-445.

the opposite was true, as every member of the RFC/RAF, from Trenchard down to the greenest observer, believed that British victories were greater than British losses. By that logic, then, offensive sweeps made sense, as the destruction of the German air service was considered the first step towards any other mission the RFC/RAF needed to perform.

What could have been seen at the time, however, was that fighter sweeps were not the most effective way to help reconnaissance or artillery spotting aircraft. Only escorts were able to allow the slower, more vulnerable two-seat aircraft to go about their business. Escort missions, of course, were tougher on single-seat pilots, as they were in a defensive rather than offensive position; however, air-to-air combat, no matter how glorious, may not always have value.¹⁹⁸ As well, escort missions were probably a more effective way of enticing the German air service to fight.

This is evidenced by the official history's summation of the Royal Air Force's attacks on some Somme bridges beginning August 11, 1918. In these attacks, the RAF did very little damage to the bridges, and lost heavily due to the effective German defences. This does not mean however, that the attacks were complete failures:

The air operations during the battle had important though unexpected results. The British losses were heavy, but so were the German. Indeed the German air service was so roughly handled that it was never able to fully recover... The German fighters, in attempting to prevent the bombers from hitting the bridges, were protecting, as it were, a series of pin-points. *The position was unlike anything that had happened before.* In the past the German pilots had been able to suit their tactics to the general conditions. The air forces opposed to them were numerically stronger, and it was sound tactics to seek every advantage, to choose the moments for intervention, to break off an action when the advantages, whether of surprise or arising from conditions of the sun or the light, had disappeared... The bombing attacks on the vital Somme bridges, however, forced the German air service *to give specific battle*... Although, when the bombing had ended, the bridges remained intact,

¹⁹⁸ The exception to this is when a pilot shoots down an enemy reconnaissance or observation aircraft, thus denying the enemy information. However, offensive sweeps far behind enemy lines were unlikely to come across anything but German fighters.

in their neighbourhood lay the wreckage of some of the best of the German aeroplanes which had carried to destruction with them pilots irreplaceable for their experience and character.¹⁹⁹ [*Italics mine*]

It seems obvious, then, that even if the destruction of the enemy air service was a high priority of the RFC/RAF, offensive patrols were not necessarily the best way to achieve that goal. Instead, the only way to give Allied pilots the chance to destroy the German air force was to attack targets that the Germans had to defend. While it is understandable that it took time for the British air services to learn this lesson, as there was no past experience to draw upon, it is unfortunate that another even more bloody conflict would find Allied air forces having to learn the same lesson all over again.

Of course, the next question to be addressed is whether ground attack was valuable in and of itself, and not just in relation to other types of missions. This is an especially important question when one takes into consideration the casualties incurred during ground attack missions. However, when one takes into consideration the anecdotal evidence provided by soldiers of both sides during the German spring offensives, and importance of aerial support of tank operations during the British summer offensives, there can be little doubt that ground attack was valuable. Certainly British ground commanders believed in its value, with the most extensive expressions of interest coming from officers of the Tank Corps, who considered aerial support critical for tank operations.

However, this is not to close the possibility that, while valuable, ground attack was *less* valuable than other potential uses for the resources ground attack claimed.

Inherently, this question is nearly impossible to answer, due to the astounding number of

¹⁹⁹ Jones, H.A., and Raleigh, Walter. *The War in the Air: Being the Story of the Part played in the Great War by the Royal Air Force. Volumes I – VI, plus Appendices*. London : Imperial War Museum, Dept. of Printed Books ; Nashville, Tenn. : in association with the Battery Press, [1997-]. *Volume VI*. Pp. 456-457.

“what-ifs” involved. *What if* the RFC/RAF had ignored ground attack completely?

Could the extra resources freed have allowed the RFC/RAF to dominate the skies more thoroughly? How many resources would this have freed up for the army? What would this have done to the Tank Corps? If ground attack was not particularly valuable, does this not mean that tanks themselves had low value, for air support was considered essential to successful tank attacks.²⁰⁰

Of course, it would have been impossible, merely from a casualty perspective, to have a large percentage of aircraft assigned to ground attack permanently. However, this does not mean that when ground attack assignments did come, most likely for major offensives, a larger percentage of aircraft could not have been devoted to the role. If nothing else, this would have probably meant that the casualties that did occur while in the ground attack role would have been more likely to “mean something.” After all, decisions on how to use the RFC/RAF had to be based upon overall effectiveness, not on what task British crewmen felt most comfortable with.

Finally, one has to remember that part of the slowness of change in regards to ground attack was impossible to avoid, as most changes to ground attack either came from the bottom of the RFC/RAF hierarchy, or from outside of it, as from the Tank Corps. For better or for worse, the RFC/RAF emphasis on offensive spirit and moral effect never lessened; as much of this emphasis began with Trenchard, it was inevitable that it would have a strong effect on the entire British air service. To find extra emphasis placed upon ground attack, however, one has to look at a lower level. After Amiens, for

²⁰⁰ Another possibility is that artillery could have reduced tanks’ reliance on aircraft. However, certainly Elles, the GOC Tank Corps, thought that air support was essential. Perhaps, however, that air support could have come in the form of dedicated corps artillery spotting aircraft. Again, this adds even more “what-ifs” to the situation.

example, it was Brigadier-General L. Charlton, the commander of V Brigade, RAF, in support of General Rawlinson's Fifth Army, who executed a crash ground attack program, including orders that ground attack was to be considered more important than *all* other missions. Other brigades, however, never placed the same emphasis upon ground attack.

Of course, there is still much to examine. Possibilities for further study include a comparison of British ground attack efforts with German ground attack efforts. As was indicated earlier in this thesis, there is every indication that the Germans were better at concentrating their aerial efforts than the British were: were they more effective as a result? As well, did the RFC/RAF *learn* from German low work?²⁰¹ The overarching themes that drove the British in many of their aerial endeavours could also be examined profitably. To use another direct comparison, while the Germans generally settled for defensive aerial operations and temporary, local air superiority, the British were driven in their quest to achieve *complete* air superiority. While these concepts are touched upon in this thesis, it would certainly seem that an in-depth examination into the effects of the theories that drove British efforts would be profitable. While many works have been published on the Bishop controversy, who shot down Richthofen, and the German Zeppelin attacks, to name a few examples, relatively little has been done on less glamorous topics, such as the one that this thesis deals with. Hopefully, in the future, it will be possible for readers of military history to discover that there was more to the war in the air in World War I than aces and Zeppelins.

²⁰¹ While Maurice Baring indicates that the Germans copied from the British in this matter, his is not necessarily the last word on the subject. Baring, Maurice. *Flying Corps Headquarters, 1914—1918*. London: W. Heinemann, 1930. P. 244.

This thesis has attempted to make it clear that ground attack or low work operations were only performed by the British air services when those services were *forced* to perform them. This trend would continue. While the only action the RAF saw during the interwar period was tactical in nature, this work being imperial duties, all future *plans* were designed around strategic bombing. Whether the expected enemy was France (in the early 1920s), Italy, or Germany, to name a few, it was strategic bombing, whether by the RAF, or defended against by the RAF, that kept everyone's attention. This trend would continue in World War II, with Fighter Command's defence of England against the *Luftwaffe*, and then Bomber Command's strategic bombing of Germany. It would take the tactical actions of the *Luftwaffe* in France to remind the RAF that there was more to aerial combat than strategic bombing; even that reminder, however, would not occur until after many British army demands for tactical air support. In the end, however, the practicalities of war would win out over the ideology of strategic bombing; not that strategic bombing ceased, just that RAF commanders were forced to accept that there were more uses for the air force than just attempting to turn German cities into rubble. Beginning in 1942 in the African campaign, and culminating in northwest Europe in 1944-1945, tactical air operations proved their worth repeatedly. They would not be forgotten again.

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