Air/Land Integration in the 100 Days: The Case of Third Army

By Jonathan Boff

This essay examines RAF-Army co-operation during the Hundred Days campaign of August - November 1918 in the sector of British Third Army. It argues that, by focussing over much on the Battle of Amiens (8-11 August 1918), some historians have tended to suggest that the RAF's contribution to victory lay primarily as a ground attack force. This role was significant, but in fact, as the campaign continued, a range of external constraints hindered the ability of aircraft directly to impact ground operations. However, with military aviation still at a highly experimental stage of development, new missions and methods were continually evolving. The RAF managed change well and played a wide range of roles in the campaign above and beyond direct close battlefield support. Air-land integration had many dimensions, and German records suggest that the importance of the RAF lay less in any one specific mission than in the contribution it made to an apparently unstoppable British combined arms machine.

Introduction

The summer 2008 edition of this journal published an excellent essay by Dr David Jordan which, having neatly summarised the development of the Royal Air Force (RAF) during the First World War, focussed primarily on its direct provision of close ground support, particularly to General Sir Henry Rawlinson's Fourth Army. Dr Jordan argued that, despite some command and control problems, 'the Hundred Days marked the point at which the BEF was able to carry out effective Air/Land operations' and that 'the BEF and the RAF had developed an extremely high degree of cooperation that added considerably to the potency of the BEF as the war drew to a close'.[1]

Fourth Army is probably the best-known of the five British armies which took part in the 'advance to victory' of autumn 1918. The Battle of Amiens, in particular, dominates the historiography of the Hundred Days. J.C. Slessor's influential book 'Air Power and Armies', for example, has much to say about Amiens, but pays little attention to the application of air power thereafter.[2] This article concentrates primarily on the RAF's work with Third Army, Rawlinson's neighbour to the north, during the Hundred Days. It broadly reinforces Dr Jordan's conclusions but also casts a slightly different light on RAF - Army cooperation during this period. Specifically, it first points out that as the campaign unfolded a range of constraints increasingly inhibited the RAF's ability directly to impact ground operations. Secondly, it develops Dr Jordan's point that air power in 1918 remained 'at its earliest stage of development'. The conduct of air operations remained highly dynamic and was characterised by ongoing experimentation. Different formations employed a variety of methods of close support provision. The RAF was also continually expanding and refining its repertoire of roles on the First World War battlefield. Thirdly, it explores German perceptions of the impact of British air operations. These suggest that the RAF's contribution to victory can be seen less in specifics, such as the tonnage of bombs dropped in close air support, than in the larger part the RAF played in the overall British combined arms effort. In other words, it lay in Air/Land integration interpreted in the broadest sense.

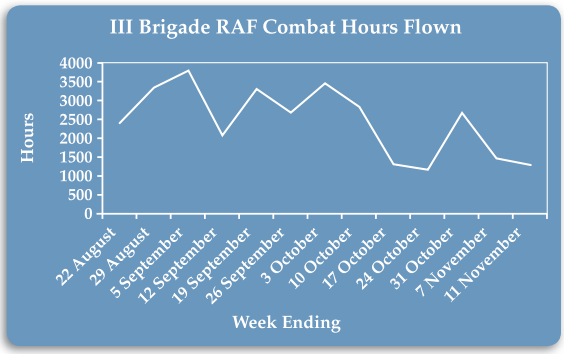
Commanded by General Sir Julian Byng, descendant of both the ill-starred admiral and a Waterloo brigade commander, Third Army advanced some 60 miles between 21 August and 11 November. It launched major set-piece attacks on 21 and 23 August, followed by days of scrappy fighting around Bapaume until the Germans retreated to the Hindenburg Line on 3 September. On 27 September Third Army, as partof Marshal Foch's carefully coordinated offensive all along the Western Front, assaulted the Hindenburg Line. Again, several days of confused combat ensued before the Germans fell back to the Beaurevoir Line southwest of Cambrai. This line was breached by another deliberate assault on 8 October, compelling the Germans to withdraw behind the River Selle. By now, logistics were proving troublesome and preparations for the next push took time. The British

carried out an audacious crossing of the Selle on 20 October, followed by another large-scale planned attack three days later, in the face of which the Germans again recoiled. The last enemy defensive position, running north-south through the western edge of Le Quesnoy, was broken on 4 November and Third Army pursued the Germans eastward, liberating Maubeuge on 10 November. When the Armistice took effect, cavalry had penetrated a few miles inside Belgium.

Throughout the campaign, Third Army enjoyed the support of III Brigade RAF under Brigadier-General Charles Longcroft, later first commandant of the RAF College at Cranwell. In August 1918 III Brigade was made up of a balloon wing and of two aeroplane wings with 197 aircraft in all. Twelfth (Corps) Wing, under Lieutenant Colonel A.B. Burdett, was equipped with 61 R.E.8 two-seaters in three squadrons: numbers 12, 15 and 59. Number 13 Squadron joined during the Hundred Days. Each squadron was attached to an army corps for liaison and artillery spotting work. Thirteenth (Army) Wing, led by Lieutenant Colonel (later Air Marshal) P.H.L. Playfair, mustered 136 aircraft, of which the Sopwith Camel, Sopwith Dolphin and S.E.5a machines of numbers 3, 56, 60 and 87 Squadrons were responsible for air superiority and close air support. Number 57 Squadron's D.H.4s were used for bombing by day, the F.E.2bs of number 102 Squadron for bombing by night, while number 11 Squadron flew reconnaissance in Bristol Fighters. In the course of the campaign, Playfair was replaced by Lieutenant Colonel A.J.L. Scott, and numbers 201 and 210 Squadrons joined. A reorganization transferred some squadrons into a newly formed Ninetieth Wing under Lieutenant Colonel G.W.P. Dawes. Other units were attached from time to time as required, most notably including the American 17 and 148 Squadrons.

Three external constraints worked hindered air operations in the Hundred Days. The first was weather. Early morning fog was a particular problem. For example, aircraft due to support Third Army's first major attack of the campaign, scheduled for 04.55 hours on 21 August, were unable to take off before 10.00.[3] This prevented planned dawn attacks on enemy aerodromes as well as delaying direct air support to ground troops. Number 73 Squadron had been specially tasked with targeting enemy anti-tank guns to help the attacking armour, but by the time it was over the battlefield, most tank operations had already finished. Over the days that followed, cloud prevented day bombing from altitude on several occasions, although close ground support missions could sometimes be flown. Number 3 Squadron spent at least 203 hours on ground attack between 21 and 30 August, despite two days completely lost to poor weather.[4] As the autumn closed in, this problem inevitably grew. Although only two days in September were complete washouts, flying was impossible on ten in October and every day in November except the first and fourth of the month.[5] The chart on the opposite page top shows how air support fell as autumn advanced.[6]

A good example of the impact weather could have on operations is given by the counter-battery



artillery effort. Perhaps the most complex of the new techniques of war developed between 1914 and 1918, it incorporated a range of brand new technologies which included sound-ranging, flash-spotting and, of course, the aeroplane, used both to identify hostile gun positions and to spot for friendly artillery engaging them. In the run-up to the 21 August offensive, the British identified 86 German artillery emplacements in the sector opposite VI Corps alone; 70% of the heavy artillery effort was devoted to their neutralization.[7] On the day of the attack, number 11 Squadron called in destructive shoots on four hostile batteries and neutralising fire on seven others. Three other targets were engaged for effect, and the positions of another 34 batteries reported. Another good example is the work of Lieutenants Griffin and Knox (number 15 Squadron) who ranged 48 rounds onto 'hostile battery XW.9', causing three large explosions and one fire. Balloons also helped direct fire onto two German batteries, and located another eleven.[8] Similarly, for the 27 September attack the RAF helped identify 70 counter-battery targets for VI Corps.[9] Inclement weather, however, rendered counter-battery flying almost impossible in the week ending 24 October, and VI Corps artillery could engage only eleven targets in support of the 23 October attack.[10]

The second major constraint was opposition from the German air service. At Amiens on 8 August about half all British fighters available had been allocated to ground attack. The violence of the German fighter response, however, took the RAF by surprise and contributed to the outright loss of 45 aircraft, with another 52 written off. *Generalleutnant* Ernst von Hoeppner, commander of the German air service, considered 8 August his most successful day of the war.[11] The rate of wastage of low flying British aircraft on that one day was 23 per cent.[12] Clearly more fighter cover was required, and never again was such a high proportion of air assets tasked with ground support. In Third Army on 21 August three squadrons of fighters, from an available fourteen, were deployed in this role; this was reduced to just one for the Hindenburg Line attack on 27 September and for the last major assault on 4 November. Thus, where Amiens had seen a concentration of some twelve fighters per mile of front on ground attack, this figure fell to four on 21 August and thereafter to a little over one.

The German air threat remained potent until the end of the war. 30 October, indeed, saw 'the most intense day of air fighting which the war had provided', accounting for 67 German and 41 British machines.[13] Four factors underpinned this threat. First, the Fokker D.VII, fitted with a 185 horse power BMW engine,

remained superior to any British fighter.[14] Secondly, experienced aces like Ernst Udet were still at work: he recorded his 60th kill on 23 August.[15] Thirdly, although morale was rapidly deteriorating in the German army, there is no evidence of this problem affecting the air service.[16] The fourth and most important factor, however, was that throughout the campaign the Germans managed to offset strategic numerical inferiority with an impressive display of operational flexibility, rapidly shifting fighters to where they were most needed. Thus, for example, one fighter wing based near Laon flew 150 kilometres to Cambrai one morning in September, spent the day supporting a German counter-attack there, returned home in the evening, and was in action again over Laon the next day.[17]

Given the vulnerability of First World War aircraft to even small-arms fire, it would be unsurprising if RAF fighter pilots preferred air-to-air, rather than air-to-ground, missions. It should also be remembered, however, that air superiority operations still had a direct and positive impact on the ground fighting. Obviously they enabled other, more offensive, RAF work, including ground attack, but they also severely restricted effective German defence. German indirect artillery relied heavily on balloons for observation, and a high priority every morning was to drive those balloons down. Number 3 Squadron was given special responsibility for this on 27 September, for instance.[18] Further, by denying hostile aeroplanes the freedom to roam over British lines, the RAF prevented reconnaissance of movements behind the British front which might give warning of an attack. On 26 September, as Third Army made final preparations for the next day's assault on the Hindenburg Line, for example, *IV Reservekorps* warned that its aircraft were finding it impossible to gain any view of the British rear areas as a result of particularly strong British defensive patrols. Three days later, the same unit complained that between 30 and 50 British machines had blocked all attempts to head west at every altitude, destroyed two German aeroplanes and two balloons, and prevented any warning of that morning's attack.[19]

The third constraint on RAF influence lay in the area of tank cooperation. The destruction of anti-tank guns was, as Dr Jordan pointed out, a high priority, to which number 73 Squadron was permanently dedicated from 21 August on, while number 8 Squadron carried out liaison duties with the tanks. However, where in August almost all tanks had been concentrated to attack with one army, when the offensive widened in September all five British armies wanted to employ them simultaneously and they became more dispersed. The specialist squadrons could not be everywhere and neither number 8 nor number 73 Squadron fought in the Third Army sector after 24 August. Less experienced squadrons had to try to fill the gap. At the same time as demand for tanks increased, their supply fell due to heavy losses. By 20 October 55% of the tanks and 44% of tank crews which had begun the campaign in August had become casualties.[20] So, where Third Army had the use of 156 tanks on 21 August, it commanded just eleven on 4 November. As the importance of tanks declined, so too did that of the

RAF in the tank support function.

These three factors combined significantly to reduce the impact of the RAF as the campaign wore on. We can also see, however, quite how well integrated the RAF already was into the entire British combined arms machine. Only when the aviation element was operating at full power were the other arms able to do the same. This becomes even clearer if we consider some of the other functions carried out by the RAF during the Hundred Days.

The first and most important of these was as what Martin van Creveld has termed the 'directed telescope' of command, allowing senior generals to gather intelligence direct from the front, bypassing the established chain of command.[21] This took two main forms. First, aircraft carried out reconnaissance, both photographic and real-time, to determine enemy dispositions and movements. III Brigade took 12,405 photographs during the campaign.[22] Aircraft warned of impending German counter-attacks and called in artillery shoots to break them up, as they did for 63rd Division at Anneux on 27 September.[23] Similarly, if aeroplanes spotted an enemy withdrawal, British units could be directed to follow up. Third Army orders on 3 September were: 'from aeroplane reports the enemy appears to have withdrawn opposite the fronts of V Corps, IV Corps and VI Corps. Corps will pursue the enemy….'[24] Secondly, and no less importantly, the RAF told commanders the location and status of friendly forces through 'contact patrols'. Number 13 Squadron, for example, flew five of these patrols for XVII Corps at set intervals throughout 27 September. The infantry were to watch out for these patrols and signal their position by flare, panel, or reflective disc.[25] Aircraft had a marked speed advantage over other forms of communication while an attack was underway. It might take hours to extend telephone and telegraph networks to advancing troops. Runners got lost or became casualties. Even in fair weather, a pigeon took 55 minutes on average to make its way home. Wirelesses were in short supply and cumbersome, were rarely deployed forward of brigade headquarters, and were a new medium to which all were still becoming accustomed. Poor signals discipline resulted in wireless messages taking an average 40 minutes to get through. News brought by contact patrols, on the other hand, was generally only 24 minutes out of date.[26] As operations became more fluid and communications consequently ever harder, the utility of these grew. Indeed, by 2 October, corps squadrons were being ordered, before they went searching for German artillery, to locate *British* gun positions.[27]

Secondly, in the course of August Third Army received a flight of Bristol Fighters, specially equipped with wireless and tasked with long range observation. Their job was to spot for the heavy artillery firing on targets, such as communication nodes, over 10,000 yards behind the line. This fire had previously, of necessity, been unobserved.[28]

A third, more experimental, role was the air supply of infantry. In late August, corps squadrons dropped between 30,000 and 60,000 rounds of

small arms ammunition each day.[29] The true impact of this air supply is hard to quantify. Infantrymen generally carried 120 rounds per man into action, so 60,000 would only restock 500 men, or about a battalion. On the other hand, a small amount of ammunition at a critical time can prove decisive, and air supply offered speedy delivery. For instance, two infantry companies, surrounded near Miraumont on 24 August, managed to hold out until relieved after number 15 Squadron dropped them boxes of ammunition and a (equally welcome?) message of encouragement from the corps commander.[30]

Experimentation continued also in relatively well-established functions of the RAF. One example was air-to-air tactics. The Germans were sending up patrols of 20-40 aircraft at irregular intervals during the day. The smaller, more or less continuous, British patrols were thus finding themselves either in a sky empty of potential targets, or in danger of being overwhelmed. On 22 September, therefore, Brigadier-General Longcroft ordered a change. Offensive patrols were thenceforth to be conducted at least two squadrons strong, generally with S.E.5s or Dolphins above and Camels below. Within each squadron, different flights were also to operate at different altitudes.[31] The result was a *Luftsperre* ('aerial barricade') which the Germans, as we have already seen, found so frustrating.

The second area to see ongoing experimentation was air-to-ground support. This is best seen in the close support effort for the offensives launched by three different armies, supported by their RAF brigades, against the Hindenburg Line in late September. All three adopted different approaches. I Brigade (First Army) allocated five squadrons to ground support and specified targets for their first patrol. Thereafter, all five squadrons landed at Le Hameau aerodrome. A single specially detailed officer (Major B.E. Smythies) here commanded them, allotting targets and priorities on the basis of information received from First Army's Central Information Bureau.[32] V Brigade (Fourth Army), as Dr Jordan explained, used a similar system.[33] The approach of III Brigade (Third Army) was more *laissez-faire*. Only number 201 Squadron was dedicated to ground attack and, instead of having specified objectives for its first patrol, it was left to find its own targets of opportunity. Number 201 Squadron then landed at an advanced landing ground and came under direct control of the Thirteenth Wing commander, who allocated subsequent targets. At the same time, however, another three squadrons carrying out offensive patrols were free to attack any ground target which took their fancy.[34] It is impossible now to quantify how far this less coherent effort undermined coordination of fires both within the RAF and between aircraft and artillery, but it does seem reasonable to conclude that no single doctrine applied across all the British armies. We should not underestimate the extent to which the RAF was grappling not only with new and rapidly evolving technology, but also with an extremely dynamic battlefield environment. Every British innovation met a German response which forced further change, and *vice versa*. In this atmosphere of continual experiment,

it is not surprising that different units, facing different challenges, sometimes evolved different approaches.

In the course of the Hundred Days III Brigade RAF flew nearly 32,000 hours of combat missions, fired millions of machine-gun rounds and dropped over 19,000 25-pound, and 1,700 112-pound, bombs. It claimed 352 German aircraft and twelve balloons destroyed.[35] This impressive output demonstrates the effort made by the RAF during the campaign, as do the high casualty rates. Number 57 Squadron, for example, had over 100 per cent battle casualties in August, September and October, losing 24 pilots and 30 observers.[36] To judge the success of this effort, however, we need to examine it from the German perspective. In the absence of hard data on casualties directly caused, let alone on the extent to which enemy tactical and operational mobility was impaired by RAF interdiction, this therefore needs to be somewhat impressionistic.

First, there is some evidence that the Germans found British fliers 'even more annoying and enterprising' than French airmen. *Generalleutnant* Curt von Morgen moved from a sector opposite the French to command *XIV Reservekorps* facing Third Army in late August. He noted that, where the French bombed only by night, the RAF strafed and bombed marching troops and locations also by day. The British flew even on cloudy days! In dog-fighting also, he considered the British 'bolder and more skilled' than the French.[37]

We have already noted the defensive success achieved by Longcroft's new strong patrols in late September, and the problems this caused for German intelligence-gathering and artillery spotting. The air superiority thus gained, however, could also be turned to more offensive usesFirst of these was ground attack. Offensive patrols which found themselves unopposed by German aircraft were free to turn their attention to enemy ground troops. *IV Reservekorps* complained on 26 September that it had insufficient fighters to prevent British ground attack, and on 3 October that its infantry and artillery were being strafed and bombed by groups of upto 40 British fighter-bombers. This was not a new problem for the Germans.[38] As early as 21 August, *Generalkommando 54* noted that 'enemy air activity was extraordinarily heavy, great numbers of low-flying aeroplanes continuously strafed our defensive positions and attacked our troops and balloons with machine-guns and bombs'.[39]

Secondly, RAF interdiction operated in three zones. While fighter-bombers swept roads immediately behind the front, the bombing squadrons of III Brigade concentrated on villages, roads and bridges slightly further back and bombers from IX Brigade (Brigadier-General R.E.T. Hogg, under the direct command of RAF HQ) attacked railway stations deep behind the lines. Thus, during the night of 26/27 September, III Brigade dropped one and three quarter tons of bombs on villages four to five miles behind the line while IX Brigade attacked Busigny station, twenty miles back. This bombing, generally carried out from 12,000 feet or higher, was inevitably inaccurate: Major-General J.M. Salmond, commander of the RAF in France, admitted that 'an error of 1,000 yards is not at all excessive' even in daylight.[40] Nonetheless, judging

by the German records, the combined effect of RAF interdiction was at least a serious irritant to the Germans. Both *Heeresgruppe Boehn* and *Armeeoberkommando 2* complained of strong enemy attacks on their reinforcement and supply columns on 29 September, for example.[41] Even units moving in the dark were not immune. *Infanterie-Regiment Nr. 66* lost men and horses, and one battery of a field artillery regiment all its limbers, to night attacks.[42] There is evidence that the bombing of railway stations and junctions caused problems, too. As early as 9 September, blockages on the railways were delaying ammunition trains.[43] More dramatically, RAF bombs on 1 October set fire to an ammunition train at Aulnoye, a particularly important junction through which all traffic west of the Ardennes flowed.[44]

Important as all the direct physical effects of RAF operations seem to have been, however, the moral effects were perhaps even greater. First, the RAF had a direct impact on German morale. The pace of operations was such that the ever-weaker German infantry divisions had only rare chances to rest and integrate replacements. The RAF, by raiding German rear areas, was able to maintain pressure even on units out of the line. So, for instance, *1 Garde-Reserve-Regiment* claimed to have had only three days of rest between 5 August and 11 November, and that it had been under enemy air attack even then.[45] It is not surprising that on 1 November *Armeeoberkommando 2* reported the regiment's parent division 'not mission-capable', the lowest of four possible ratings.[46]

Secondly, air operations had a more general effect on morale. On the whole, the German army explained its defeat in 1918 in one of two ways. One was that the German army itself was never conquered, but was betrayed by a collapse of home front morale whipped up by Bolsheviks and pacifists. This 'stab-in-the-back' myth, first popularised by Ludendorff but later notoriously exploited by the Nazis, deserves little serious consideration here.[47] The other explanation was that the army was simply overwhelmed by the material superiority of Germany's enemies.[48] That the Germans were outnumbered and outgunned affected not only their physical capacity to resist, but also their moral ability to do so. As the German official history explained, 'everyone recognized that on one side enemy strength in men and *matériel* was growing, while on the other our own was declining. As hope of victory declined, the will to fight also began to flag'.[49] The inability of the German air service to disrupt the large numbers of British aeroplanes overhead not only exposed the defending infantry to more accurate artillery fire but was also demoralizing in its own right.[50] The RAF played an important role in continually reinforcing the German sense of material inferiority, and so hopelessness, which contributed to the collapse of resistance.

This essay has argued that, important as the ground attack role was, the RAF in fact played a wide range of parts during the Hundred Days in the face of a variety of serious challenges. As those challenges evolved, so too did the conduct of air operations. Experimentation and change remained key features of the RAF experience to the end of the war,

as did ever closer integration into every part of the British combined arms machine. Some historians have suggested that the key to British victory was the discovery and application of a set combined arms 'formula for success'.[51] Nowhere is this less true than in the case of air/land integration, which had to respond to ever-changing situations on the ground and in the sky, all while grappling with new technology. Only if we see the Royal Air Force of 1918 both in the context of this highly dynamic environment, and as an integral part of the combined arms effort, can we see its achievements in full perspective.

Notes

[1] David Jordan, 'The Royal Air Force and Air/Land Integration in the 100 Days', Air Power Review Volume 11, Number 2, pp. 12-29: pp. 27, 28.
[2] J.C. Slessor, Air Power and Armies (London: Oxford University Press, 1936).
[3] The 24 hour clock has been used here for consistency's sake, although the British army did not adopt it until 1 October 1918. All dates here are 1918, unless otherwise specified. German units are italicized.
[4] Number 3 Squadron War Diary, The National Archives, Kew (TNA) AIR 1/166/15/142/19.
[5] *Ibid*.
[6] III Brigade Weekly Summaries of Work, 28 December 1917 - 11 November 1918, TNA AIR 1/1518/204/58/65.
[7] Counter Battery Map, 21 August, VI Corps General Staff War Diary, TNA WO 95/774; VI Corps Artillery Narrative, 21 August - 11 November, VI Corps General Staff War Diary, TNA WO 95/775.
[8] III Brigade Weekly Summaries of Work, 28 December 1917 - 11 November 1918, TNA AIR 1/1518/204/58/65.
[9] Counter Battery VI Corps Operation Order No. 5, 25 September, 2nd Division General Staff War Diary, TNA WO 95/1302.
[10] Weekly Report on Operations, week ending 24 October, IV Corps General Staff War Diary, TNA WO 95/718; Counter Battery VI Corps Operation Order No. 3, 22 October, VI Corps Commander Heavy Artillery War Diary, TNA WO 95/789.
[11] Ernst von Hoeppner, *Deutschlands Krieg in der Luft: Ein Rückblick auf die Entwicklung und die Leistungen unserer Heeres-Luftstreitkräfte im Weltkriege* (Leipzig: K.F. Koehler, 1921), p. 174.
[12] H.A. Jones, The War in the Air: Being the Story of the Part Played in the Great War by the Royal Air Force 1914-1918 Volume VI (Oxford: Clarendon Press), pp. 445-446.
[13] *Ibid*., p. 544.
[14] *Ibid*., p. 445.
[15] *Armeeoberkommando 2*, evening report 23 August, *Heeresgruppe Boehn* War Diary, Bundesarchiv-Militärarchiv, Freiburg (BA-MA) PH 5 I/47.
[16] For the interesting debate about exactly how and when German army morale crumbled, see Alexander Watson, Enduring the Great War: Combat, Morale and Collapse in the German and British Armies, 1914-1918 (Cambridge: Cambridge University Press, 2008), chapter 6.
[17] Hoeppner, *Deutschlands Krieg in der Luft*, pp. 172-173.
[18] Special Operation Order No. 12, 24 September, Thirteenth Wing Operation Orders, TNA AIR 1/1808/204/161/4.
[19] Situation Report Ia Nr 356, 26

September, and Summary of Intelligence on 29 September, Ic, dated 30 September; entry for 29 September: all in *IV. Reservekorps Generalkommando* War Diary, BA-MA PH 6/II/23.

[20] G.S. 59/4, 29 October, Report by Major-General H.J. Elles, Liddell Hart Centre for Military Archives, King's College London (LHCMA) Fuller I/7/17.

[21] Martin Van Creveld, Command in War (Cambridge: Harvard University Press, 1985), p. 75.

[22] III Brigade Weekly Summaries of Work, 28 December 1917 - 11 November 1918, TNA AIR 1/1518/204/58/65.

[23] Narrative of Operations, 27 September - 2 October, 63rd Division General Staff War Diary, TNA WO 95/3097.

[24] Telegram G.B. 114, 10.08 hours 3 September, Third Army Operations, TNA WO 158/227.

[25] The Western Front – Air Operations May - November 1918, TNA AIR 1/677/21/13/1887, p.250.

[26] Narrative of Operations, 21-25 August, 1st Tank Brigade HQ War Diary, TNA WO 95/99.

[27] Third Army Artillery Instructions No. 44, G.O. 59, 2 October, Third Army Operations, TNA WO 158/228.

[28] The Western Front – Air Operations May - November 1918, TNA AIR 1/677/21/13/1887, p. 76.

[29] *Ibid*., p. 195.

[30] History of Number 15 Squadron, TNA AIR 1/166/15/153/1.

[31] Jones, The War in the Air, pp. 506-507.

[32] This system had first been used on 26 August. The Western Front – Air Operations May - November 1918, TNA AIR 1/677/21/13/1887, pp. 252, 198.

[33] Jordan, 'The Royal Air Force and Air/Land Integration', pp. 24-25; Jones, The War in the Air, pp. 524-526.

[34] Special Operation Order No. 12, 24 September, Thirteenth Wing Operation Orders, TNA AIR 1/1808/204/161/4.

[35] III Brigade Weekly Summaries of Work 28 December 1917 – 11 November 1918, TNA AIR 1/1518/204/58/65.

[36] Number 57 Squadron Miscellaneous Returns, TNA AIR 1/1500/204/39/15.

[37] Morgen, Curt von, *Meiner Truppen Heldenkämpfe* (Berlin: Ernst Siegfried Mittler und Sohn, 1920),p. 154.

[38] Situation Reports Ia Nr 356, 26 September, and. Ia Nr 432, 3 October, *IV. Reservekorps Generalkommando* War Diary, BA-MA PH 6/II/23.

[39] *Generalkommando 54* War Diary, BA-MA PH 6 V/68.

[40] Memorandum on Bombing Operations, June 1918, reproduced in Jones, The War in the Air, Appendices Volume, p. 112.

[41] *Heeresgruppe Boehn* War Diary, BA-MA PH 5 I/47; *Armeeoberkommando 2* War Diary, BA-MA PH 5 II/124.

[42] Lademann, Ulrich, *Das 3. Magdeburgische Infanterie-Regiment Nr. 66* (Berlin: Gerhard Stalling, 1922), p. 85; Geyer, *Feldartillerie-Regiment Nr. 225* (Oldenburg: Gerhard Stalling, 1923), p. 211.

[43] *Heeresgruppe Boehn* War Diary, BA-MA PH 5 I/47.

[44] *Armeeoberkommando 2* War Diary, BA-MA PH 5 II/124.

[45] Brederlow, Tido von, *Geschichte des 1. Garde-Reserve-Regiments* (Oldenburg: Gerhard Stalling, 1929), p. 336.

[46] Report Ia 6/XI, 1 November: *Untersuchungsausschuss der Deutschen Verfassunggebenden*

Nationalversammlung und des Deutschen Reichstages 1919-1926, '*Die Ursachen des Deutschen Zusammenbruchs im Jahre 1918*', Volume VI (Berlin: Deutsche Verlagsgesellchaft für Politik und Geschichte, 1928), p. 336.

[47] See Wilhelm Deist, 'The Military Collapse of the German Empire: The Reality Behind the Stab-in-the-Back Myth', War in History Volume 3, Number 2 (April 1996), pp. 186-207.

[48] See, for example, Morgen, *Meiner Truppen Heldenkämpfe*, pp. 147-148.

[49] German Army Military History Research Section, *Der Weltkrieg 1914 bis 1918: Die Militärische Operationen zu Lande Band 14: Die Kriegführung an der Westfront im Jahre 1918* (Berlin: Ernst Siegfried Mittler und Sohn, 1944), p. 759.

[50] Viereck, Helmut, *Das Heideregiment Königlich Preußisches 2. Hannoversches Infanterie-Regiment Nr. 77 im Weltkriege 1914 – 1918* (Celle: August Pohl, 1934), p. 610; Brandis, Cordt von, *Die vom Douaumont: Das Ruppiner Regiment 24 im Weltkrieg* (Berlin: Tradition Wilhelm Kolk, 1930), p. 461.

[51] Robin Prior and Trevor Wilson, Command on the Western Front: The Military Career of Sir Henry Rawlinson 1914-18 (Oxford: Blackwell, 1992), p. 289.