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THE DEVELOPMENT OF MACHINE GUN DOCTRINE DURING THE FIRST  
WORLD WAR FOCUSING ON MACHINE GUN COMMANDERS AS  
INNOVATORS

BY

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## ABSTRACT

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The development of machine gun doctrine from 1898 to the end of the First World War is an example of military innovation in action. This thesis explores that development focussing on the men who created it as innovators. There are several different theories of military innovation put forward by Rosen, Posen, Murray, Foley and Farrell, and this thesis will examine them with regard to the development of machine gun doctrine. There were four major innovators. An American, John Henry Parker honed his skills in the Spanish American War of 1898 and used this experience to develop machine gun doctrine for the US Army. He can be identified as the 'father of machine gun doctrine' as his ideas were adopted by Allied armies during the First World War. Parker's work was taken up by the British officer R.V.K. Applin in 1910. Applin was active in the period before the war in trying to influence senior figures in the power of machine guns. He spent much of the war in India and America as a machine gun trainer. George M. Lindsay was the most influential British machine gun officer of the war. He was responsible for the establishment of the Machine Gun Corps in 1915 and through his work in the machine gun schools in Grantham and Camiers developed most of the machine gun doctrine for the British Army. The Frenchman, Raymond Brutinel, who fought for the Canadian Expeditionary Force, was the most influential machine gun officer in the Allied armies during the war. He was remarkable in that he had no major military experience at the outbreak of war. Yet he equipped and raised a motorised machine gun unit with his own money and turned it into the first mechanized 'all arms unit' which during the 100 Days Offensive made a significant contribution to overall victory. He was also responsible for developing the idea of barrage fire which played no small part in the victory of the C.E.F. at Vimy Ridge. This tactic was then disseminated to the rest of the British army and used effectively in the Battle of Messines by R.V.K. Applin. He was appointed a Brigadier General in 1918 and became the highest ranked machine gun officer of the Allied armies. This thesis highlights the complexities of innovation in a military setting that can occur at different levels across formations and institutions, and will act as a guide to future study in this area.

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## TABLE OF ABBREVIATIONS

A.G.	Adjutant General
A.E.F.	American Expeditionary Forces
A.N.Z.A.C.	Australian and New Zealand Army Corps
B.E.F.	British Expeditionary Force
B.G.G.S.	Brigadier General-General Staff
B.L.	British Library
B.M.	Brigade Major
B.M.G.O.	Brigade Machine Gun Officer
B.T.M.	Bovington Tank Museum
C.E.F.	Canadian Expeditionary Force
C.I.G.S.	Chief of Imperial General Staff
C.M.G.C.	Canadian Machine Gun Corps
C.M.G.O.	Corps Machine Gun Officer
C.M.M.G.B.	Canadian Motor Machine Gun Brigade
C.W.M.	Canadian War Museum
D.A.A.G.	Deputy Assistant Adjutant General
D.I.M.G.U.	Deputy Inspector Machine Gun Units
D.M.G.O.	Divisional Machine Gun Officer
D.M.T.	Director Military Training
D.O.	Director of Organisation
D.S.D.	Director of Staff Duties
F.S.R.	Field Service Regulations
G.H.Q.	General Headquarters
G.M.G.R.	Guards Machine Gun Regiment
G.S.O.	General Staff Officer

K.C.L.	King's College London
L.C.A.	Library and Archives Canada
M.G.C.	Machine Gun Corps
M.G.G.	Machine Gun Guards
M.G.G.S.	Major General General Staff
M.M.G.C.	Motor Machine Gun Corps
N.C.O.	Non-Commissioned Officer
R.A.M.C.	Royal Army Medical Corps
R.U.S.I.	Royal United Services Institute
R.E.	Royal Engineers
R.T.C.	Royal Tank Corps
T.N.A.	The National Archives
W.O.	War Office

## INTRODUCTION

The aim of this thesis is to demonstrate how developments in the use of machine guns, led by four mid-ranking officials in America, Britain and Canada prior to and during the First World War contributed to victory for the Allied side. The image of the first day of the Battle of the Somme on 1 July 1916 is imprinted in memory as the British infantry were slaughtered by German machine guns.<sup>1</sup> However, this image of machine guns as purely defensive weapons is not entirely accurate as by the end of the war, machine guns were used to launch attacks by the Allies. How did this come about? Since there in fact has been little analysis of the development of machine gun doctrine during the First World War this thesis will examine how machine gun doctrine evolved before and during the war in the British and Canadian armies.<sup>2</sup>

Machine gun doctrine which can be defined as the fundamental set of principles and policies, which are essential in organising, training, equipping, and employing machine gun units efficiently, was the product of a long drawn out process which started during the Spanish-American War (1898) and continued in the Boer War (1899-1902) and the Russo-Japanese War (1904-05). All provided machine gun experience that was seized upon by certain military officers to develop machine gun doctrine for the opening moves of the war. John Henry Parker, an American officer who was variously known as ‘Gatling Gun Parker’ or ‘Machine Gun Parker’ due to his influence on American machine gun doctrine, fought in the Spanish American War and drew upon his experience to develop ideas that would be used by others, can reasonably be called the ‘father of modern machine gun doctrine’. George Lindsay and R.V.K. Applin fought in the Boer War and although they did not use machine guns they developed an interest while observing their use by others. While none of the major protagonists of the First World War apart from Russia fought in the Russo-Japanese War, nonetheless they observed this

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<sup>1</sup> John, Keegan, *The First World War* (London, 1998). p. 317. (Hereafter Keegan, *The First World War*)

<sup>2</sup> Paul Cornish, *Machine guns and the Great War* (London, 2009) (hereafter Cornish, *Machine guns & the Great War*). The most recent book on the subject is Paul Cornish’s *Machine guns and the Great War*, published in 2009.

war closely.<sup>3</sup> Raymond Brutinel, a Frenchman who fought with the Canadian Expeditionary Force established a motorised machine gun unit on the outbreak of the war and was also responsible for the development of machine gun barrage fire, was not involved in the pre-war military but took a private interest in this conflict and drew his own conclusions outside of any military confines.

This thesis explores the formative influence of the American John Henry Parker, the Frenchman Raymond Brutinel, and two Britons, R.V.K. Applin and George Lindsay, in the formation of machine gun doctrine, thereby addressing a significant lacuna in the historiography of the First World War military innovation. These officers were innovators in the development of new tactics for deploying the machine gun in the British and Dominion forces. Major C.D. Baker-Carr was instrumental in calling for the establishment of a separate Machine Gun Corps (M.G.C.). Captain George M. Lindsay was involved in training marksmen at the start of the war and also influenced the establishment of the M.G.C. He developed tactics for using machine guns as an offensive weapon. The idea of overhead or long range searching fire had been mooted by Captain R.V.K. Applin in 1910, but Lindsay developed this concept into barrage fire. Lieutenant Colonel Raymond Brutinel of the Canadian Machine Gun Corps took this idea of mass barrage fire and turned it into a viable tactic which was used by the Canadians at the Battle of Vimy Ridge in April 1917 and then copied by the rest of the British and French armies.<sup>4</sup> The development of American machine guns doctrine was mainly the work of one man, Colonel John Henry Parker who experienced at first hand the use of machine guns in the Spanish-American War and identified the machine gun as a major contributor to success in battle. Parker published extensively about machine guns and his writings, while ignored in America, were adopted by other machine gun enthusiasts worldwide.

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<sup>3</sup> Two British generals, Lieutenant General Sir Ian Hamilton and Lieutenant General William G. Nicholson, represented Britain while the future commander of the AEF, John J. Pershing, represented the US Army. The French Army sent François Oscar de Négrier to the Japanese Army to act as an observer. There were also numerous newspaper correspondents who covered the war the most famous of whom was the *London Illustrated News* reporter, Frederic Villiers, who wrote a book about his experiences.

<sup>4</sup> Graham Seton Hutchinson, *Machine guns: their history and tactical employment (being also a history of the Machine Gun Corps, 1916-1922)* (London, 1938), pp 185-7 (hereafter Hutchinson, *Machines Guns*). There were early attempts during the Battle of the Somme to use machine guns for barrage purposes but these were localised at small unit level with no centralised control. The most famous incident occurred on 24 August 1916 when a barrage by ten machine guns of the 100<sup>th</sup> Machine Gun Company under the command of Major G.S. Hutchinson fired just 250 rounds short of one million rounds of ammunition over a twelve-hour period in support of the attacking infantry at High Wood. However, Hutchinson in fact admitted that with the Canadians 'rests the honour of having first effectively co-ordinated machine guns for the task of covering fire.' See Hutchinson, *Machine guns*, p. 175.



The thesis will examine these officers' professional relationships and attempt to gauge the influence they had on each other, if any.

## MILITARY DOCTRINE

The U.S. Air Force defined military doctrine as 'those concepts, principles, policies, tactics, techniques, practices, and procedures which are essential to efficiency in organizing, training, equipping, and employing its tactical and service units.'<sup>5</sup> J.F.C. Fuller termed it the 'central idea of an army'.<sup>6</sup> Stephen Badsey has defined military doctrine as 'the prescriptive setting out of the courses of action the armed forces should follow.'<sup>7</sup> This has been taken to mean centralised, written guidelines for the conduct of military operations and tactics: it is this modern definition that has been adopted for this thesis.<sup>8</sup> Machine gun doctrine is a subset of military doctrine. This study explores how machine guns were used and developed before and during the Great War by focussing on the various officers who deployed them. While most modern armies had adapted the machine gun by the turn of the century, tactical development tended to lag behind its deployment. Senior commanders in pre-war armies underestimated the latent power of machine guns; hence, it could be argued, that they did not devote enough time to their development.<sup>9</sup> Lessons learned from conflicts like the Boer War and the Russo-Japanese War were studied and accepted, if considered useful.<sup>10</sup> It was left to junior officers to develop an understanding of the use of new modern weapons, of which the machine gun was a prime example. Whereas these early wars provided a profusion of examples to develop new doctrine, there was no formal system to disseminate these new tactical

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<sup>5</sup> Robert Frank Futrell, *Ideas, concepts, doctrine: basic thinking in the United States Air Force, 1907-1960* (Alabama, 1989), p. 1

<sup>6</sup> Gary Sheffield, 'Doctrine and command in the British Army: a historical overview', *Army Doctrine Publication Land Operations* (Shrivenham, 2010), p. 244.

<sup>7</sup> Spencer Jones, 'The influence of the Boer War (1899-1902) on the tactical development of the regular British Army 1902-1914' (PhD thesis, Wolverhampton, 2009) p. 6 (hereafter Jones, 'The influence of the Boer War (1899-1902)').

<sup>8</sup> Ibid.

<sup>9</sup> Chief of the General Staff, *Report of a conference of General Staff officers at the Staff College, 18<sup>th</sup> to 21<sup>st</sup> January 1909* (London, 1909), p. 65; Chief of the General Staff, *Report of a conference of General Staff officers at the Staff College, 17<sup>th</sup> to 29<sup>th</sup> January 1910* (London, 1910), p. 29. At the annual British General Staff Conferences in January 1909 and January 1910 the training of machine gunners was discussed. Generals Haig, Rawlinson and Murray attended these conferences.

<sup>10</sup> François Oscar de Négrier, *Lessons of the Russo-Japanese war* (London, 1906) p. 59. See discussion of the effects of the Russo-Japanese War on machine gun doctrine

lessons to the wider army.<sup>11</sup> A further complication facing the British Army in developing new doctrine was the requirement to remain sufficiently flexible to allow a force fight a wide range of opponents, be it in tribal wars or major European conflicts.<sup>12</sup>

Military doctrine is a body of knowledge and understanding derived from study and the analysis of practical experience.<sup>13</sup> With this in mind there is a cycle to its development. It starts as theory which is then adopted as field service regulations and organisational structures. Next it becomes a feature of training and is taught as tactics. Finally, it is put into practice on the battlefield. Based on that battlefield experience, the cycle may be repeated as new developments are introduced into practice. Equipment also influences the evolution of doctrine and in the case of machine guns, the reduction in weight and the increase in firepower were key factors. The cycle was not fully understood during this period and, in terms of machine guns, was not always complete. Sometimes several elements of the cycle were left out with the result that the doctrine failed. Occasionally doctrinal changes were ignored, consequently attempt at improvements failed. Machine gun doctrine sets out certain requirements for machine guns to be used efficiently. The first is the organisation of machine guns - how they are grouped into units, and how they are controlled. By the end of the First World War machine guns in the Allied armies were organised into machine gun battalions, with around 1,000 men and officers in each unit.<sup>14</sup> These battalions took years to establish. The second requirement is machine gun tactics which allow the guns to be used more efficiently. Early machine guns were seen as merely defensive weapons. However, a machine gun used as an attack weapon is a great deal more effective and the nature of the static warfare of the Western Front made this development crucial. But although several American and British officers aired these ideas before the war, they were usually dismissed as cranks.<sup>15</sup> The third requirement was proper training. Pre-war training of machine gunners was restricted in

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<sup>11</sup> Sheffield, 'Doctrine & command in the British Army', p. 244. According to Sheffield, the British Army for example relied on semi-informal rather than formal methods of distribution of doctrine during this period.

<sup>12</sup> R.V.K. Applin, 'Machine gun tactics in our own and other armies' in *Journal of the United States Cavalry Association*, xx, (Sept 1909) p. 52. (hereafter Applin, 'Machine gun tactics in our own & other armies').

<sup>13</sup> Kees Homan, 'Doctrine' in Anna Aldis and Margriet Drent (eds), *Common norms and good practices of civil-military relations in the EU* (Groningen, 2008), p. 110.

<sup>14</sup> Hutchinson, *Machine guns*, p. 263.

<sup>15</sup> R.V.K. Applin, *Across the seven seas* (London, 1937) (hereafter Applin, *Across the seven seas*) p. 227.

most armies to a couple of days per year with little firing practice provided.<sup>16</sup> This training tended to be run by junior officers with little input or interest from senior officers.<sup>17</sup> Also financial constraints would have played a part in imposing these restrictions.<sup>18</sup> The development of machine gun technology was another key factor in the evolution of machine gun doctrine since they became significantly lighter and more mobile as the war progressed. While this development of the guns will be noted, it is beyond the scope of this thesis. Gary Sheffield has written that doctrine can be disseminated in many ways: through military publications, unofficial books and articles, teaching at military institutions and through discussions at military think tanks such as the Royal United Services Institute. Also informal dissemination can occur at the regimental level by experience being passed on between officers, while senior commanders can establish informal ‘schools’ of disciples.<sup>19</sup> According to Sheffield the British Army has relied primarily on informal rather than formal methods of dissemination of doctrine throughout most of its existence. This was the result of the historic make-up of the British Army as a loose alliance of individual regiments and corps.<sup>20</sup> Accordingly the British Army had no formal doctrine in the First World War, in the modern sense.

#### CONCEPTUAL FRAMEWORK: MILITARY INNOVATION

Military innovation provides the broad conceptual framework for this exploration of innovative developments in the design and deployment of machine guns that contributed to

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<sup>16</sup> Chief of the General Staff, *Report of a conference of General Staff officers at the Staff College, 18<sup>th</sup> to 21<sup>st</sup> January 1909* (London, 1909) p. 65. The Chief of the General Staff, General Sir William Nicholson, allocated 3,500 rounds per gun per year for training purposes and thought that was sufficient, even if it fell short of allocations authorised in other Powers.

<sup>17</sup> Dolf L. Goldsmith, *The devil's paintbrush: Sir Hiram Maxim's gun* (London, 1989), p. 122 (hereafter Goldsmith, *The devil's paintbrush*). While on manoeuvres in 1912 with the 1<sup>st</sup> Cavalry Brigade, Lieutenant Edward Spears of the 11<sup>th</sup> Hussars was put in charge of all six Maxims of the brigade. He was instructed by his brigadier to ‘ride off and see if I could put them to some intelligent use.’ See Parker, *History of the Gatling gun detachment: Fifth army corps, at Santiago, with a few unvarnished truths concerning that expedition* (Kansas City, 1898), p. 3. John Henry Parker suffered similarly when he tried to interest his commanding officer, Colonel A.T. Smith of the 13<sup>th</sup> Infantry, in machine guns prior to the Spanish-American War. His proposal was flatly rejected with the response ‘I don’t want to hear anything about it. I don’t believe in it, and I don’t feel like hearing it. If you want to see me about this subject, come to me in office hours’. The result of Smith’s refusal was that the US Army travelled to Cuba without Gatling guns in any official capacity. Parker subsequently got the Gatling guns onto the expedition under the guise of providing security for the ammunition train. See Parker, *History of the Gatling gun detachment*, p. 50.

<sup>18</sup> Dominick, Graham, ‘The British Expeditionary Force in 1914 and the machine gun’ in *Military Affairs*, xlvii, no. 4 (Dec. 1982), p. 192 (Hereafter Graham, ‘The British Expeditionary Force in 1914 & the machine gun’)

<sup>19</sup> Sheffield, ‘Doctrine & command in the British Army’, p. 244.

<sup>20</sup> *Ibid.*

military victory, and for the assessment of Parker, Lindsay, Applin and Brutinel as innovators. In his discussion of John Henry Parker and his role in the development of American machine gun tactics, David A. Armstrong quotes from a political scientist Vincent Davis on the characteristics denoting a successful innovator

1. The ... advocate ... is usually a man in the broad middle ranks (major to colonel).
2. The ... advocate is seldom the inventor of the innovation that he is promoting, but he usually possesses a uniquely advanced technological knowledge pertinent to the innovation that is not generally shared within the (army)...
3. The ... advocate is a passionate zealot.
4. The.... advocate seldom pays any attention whatever to the way in which his crusading efforts may influence his personal career in the (army)... or elsewhere.<sup>21</sup>

Stephen Rosen and Barry R. Posen pioneered military innovation studies in the late 1980s. Since then others have joined the debate, Theo Farrell and Terry Terriff among them. According to Robert Foley, there are main four schools of thought how armed forces innovate. The first was conceived by Barry R. Posen who articulated his views in *Sources of military doctrine: France, Britain and Germany between the wars*. Posen argued that it was the interaction between civilian and military leaders that created military innovation. He thought it was vital that a strong civilian leadership could force a mainly traditional military to face new challenges and threats.<sup>22</sup> These civilians need the help of serving officers (whom he refers to as military ‘mavericks’) to supply them with the military expertise that they lack, and together they can drive change.<sup>23</sup> This concept will be invoked in chapter eight in the examination of these four innovating officers’ attempts to influence political opinion about machine gun doctrine. Stephen P. Rosen challenged the view that armed forces are essentially conservative, and contented that it was not civilian intervention that drove innovation but rather certain senior officers. These senior officers recognise new threats and fight an ideological battle with fellow officers to

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<sup>21</sup> David A. Armstrong, *Bullets and bureaucrats the machine gun and the United States Army, 1861-1916* (Westport, Connecticut, 1982), p. 114 (hereafter Armstrong, *Bullets & bureaucrats*).

<sup>22</sup> Robert T. Foley, ‘A case study in horizontal military innovation: the German Army, 1916-1918’ in *Journal of Strategic Studies*, lxx, no. 6 (Dec. 2012), p. 808 (hereafter Foley, ‘A case study in horizontal military innovation’).

<sup>23</sup> Barry R. Posen, *The sources of military doctrine: France, Britain, and Germany between the world wars* (New York, 1984), pp 224-26 (hereafter Posen, *The sources of military doctrine*).

get their view across.<sup>24</sup> The thesis will consider the idea that Field Marshal Sir Douglas Haig was one such leader. Haig has been criticised as anti-technology and anti-machine gun but this thesis will argue that in fact, Haig followed the pattern of Rosen's theory of cultural model of innovation (see chapter eight). The third school of thought identified by Theo Farrell and Terry Terriff has argued that military innovation is the result of organisational culture since the internal norms and values of an organisation determine how successfully it can innovate.<sup>25</sup> Advocates of this interpretation also see military institutions as conservative and needing bold leadership to change.<sup>26</sup> This concept of cultural innovation will be examined in relation to Brutinel and the Canadian Corps in chapter eight. Another author, Adam Grissom, has developed the notion that military innovation can occur as a bottom up process. This, he maintains can frequently occur during wartime as junior officers in the field develop novel tactics to combat new situations. These new tactics, if successful, can in turn be codified and accepted as new doctrine by the army establishment. Chapter eight explores this idea and examines how the machine gun was adapted as an offensive weapon by officers in the field hence doubling its value.

As one of the most prolific authorities on military innovation Williamson Murray has observed that militaries rarely learn from the past; in fact they go out of their way to study what they feel comfortable with. This has the effect of forcing them to relearn (in combat) lessons that were readily apparent at the end of the previous conflict.<sup>27</sup> This argument is particularly pertinent in examining the development of machine guns and the lessons highlighted prior to the war. Murray is convinced that culture which plays a key role in innovation is something overlooked by historians. He emphasises that during the inter-war period, the most successful military organisations were those that encouraged debate, studied and ran experiments in their preparations for war.<sup>28</sup> The ideas advanced by Murray will be examined in relation to the culture of the Canadian Machine Gun Corps in the chapter on innovation. The work of two other authors, Adam M. Jungdahl

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<sup>24</sup> Foley, 'A case study in horizontal military innovation', p. 800.

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> Williamson Murray, 'Thinking about innovation' in *Naval War College Review*, liv, no. 2 (Spring 2001), pp 122-23 (hereafter Murray, 'Thinking about innovation'). Murray references the Royal Navy and its anti-submarine tactics that it developed during the First World War; yet, by the start of the Second World War had to re-learn them.

<sup>28</sup> Murray, 'Thinking about innovation', p. 125.

and Julia M. Macdonald, who identified the notion of gatekeepers as inhibitors of military innovation, is also especially relevant.<sup>29</sup> They argue that the hierarchical structure of military organisations allows certain individuals to develop expertise and opinions to such an extent that they can hold back innovations.<sup>30</sup> This point will be addressed by examining the influence that General Pershing had on American machine gun use during the First World War. Some authors describe innovation as a top down process while others see it as a bottom up approach.<sup>31</sup>

While different in their approaches, a common theme featured in all of these works in that personalities or individuals, be they military or civilian, are recognised as important in the innovation process. Each of the four officers selected for the study was beset by problems at the outset of his career and yet by the end of the war was recognised as ‘the go to man’ in terms of machine gun practice. Throughout this study, these officers will be examined and compared to ascertain how their ideas spread globally and to determine the extent to which they were influenced by similar authors. Other officers who had similar ideas but did not show the same resolve also feature in this thesis. Each officer had his own set of circumstances to deal with in terms of military and civilian structures. To ascertain the degree to which they might be considered innovators, the following questions need to be asked. What political or non-military links did these officers form during their careers? Addressing this will highlight the lengths to which these officers would go in order to achieve their aims. John Henry Parker forged links with Theodore Roosevelt during the Spanish American War, Raymond Brutinel was politically linked to senior officials in the Canadian administration before the Great War and R. V. K. Applin developed political links to Champ Clark, Speaker of the House of Representatives, during his visit to the US in 1917.<sup>32</sup>

How can the hypothesis that these officers are innovators be tested? Examining whether these officers could be regarded as zealots will shed light on the lengths to which these men were prepared to go in order to get their point of view across. As will become

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<sup>29</sup> Adam M. Jungdahl and Julia Macdonald, ‘Innovation inhibitors in war: overcoming obstacles in the pursuit of military effectiveness’ in *Journal of Strategic Studies*, xxxix, no. 5 (July 2014), pp 467-79 (hereafter Jungdahl & Macdonald, ‘Innovation inhibitors in war’).

<sup>30</sup> Jungdahl & Macdonald, ‘Innovation inhibitors in war’.

<sup>31</sup> Foley, ‘A case study in horizontal military innovation’, p. 802; Posen, Rosen, Farrell and Terriff describe innovation as top down while G. C. Wynne, Timothy T. Lufper, Bruce I. Godmundsson describe a bottom up cycle.

<sup>32</sup> See details in the body of the text about the individual contacts.

apparent, each of these innovators was unique: Applin, Brutinel, Parker and Lindsay were recognised by their peers as experts on machine guns and were consulted by senior officers in the Allied armies. Indeed, the fact that two of the officers acquired nicknames, for example ('the High Priest of Machine Guns' George M. Lindsay and 'Machine Gun Parker' (John Henry Parker) is evidence of their perceived expertise in their field.<sup>33</sup>

This study comprises eight chapters. Each opens with a discussion of the officer's early career and traces the sources of their ideas. Their motivations for developing their ideas are then analysed. Any influences brought to bear on them will be examined to ascertain whether there was any cross pollination of ideas between them. Throughout their careers, all four faced opposition from senior commanders, who generally were not convinced about the merits of machine guns.<sup>34</sup> How they dealt with this will be addressed. Lastly, how the theory was put into practice will be examined with a view to assessing whether the theories had any value. This examination will consist of analysing battlefield experiences where machine guns became one of the major weapon systems. Finally, the major developments that each of these four officers brought to the Great War will be evaluated. Chapter two will survey the pre-war practice of machine guns, setting the context for the First World War by focussing on the Spanish-American War, the Russo-Japanese War and examples drawn from these conflicts. As the foundations of machine gun doctrine were set down during this period by John Henry Parker and R.V.K. Applin their ideas will be discussed. Chapters three and four will concentrate on the work of George M. Lindsay and highlight his influence on machine gun doctrine in the British Army. Chapter three will focus specifically on Lindsay and his achievement in establishing the Machine Gun Corps. Chapter four will explore how he became the main coordinator of machine gun doctrine in 1917 and 1918. Chapter five will discuss the career of R.V.K. Applin as the Corps Machine Gun Officer in charge of the Battle of Messines in April 1917 and also his work as head of the British Machine Gun Mission to America in 1917-18. Chapter six and seven will deal with the work of the Canadian officer Raymond Brutinel, outlining his early career in Britain, his attempts to find a role for his Canadian Motor Machine Gun unit, and the key role that the Canadian Machine

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<sup>33</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37).

<sup>34</sup> Criticism of attitude of General Lucas regarding teaching of S.S.192, part I, 1918 (B.T.M., Lindsay Papers E2004.2375.E8).

Gun Corps played in the decisive battles of 1918. Chapter eight will discuss military innovation and explore development in machine gun doctrine in that context during the war. The main theories of military innovation will be reviewed in relation to how they can be applied to interpreting the contributions of Brutinel, Applin, Lindsay and Parker to the development of machine gun doctrine. As this study will highlight, there are a multitude of different theories. Indeed, Williamson Murray has stressed that there is no grand theory of innovation or one model that can be applied to military matters, citing that Stephen Rosen has shown the difficulties of attempting to develop one grand theory.<sup>35</sup> The conclusion focus on the interwar years and examine how machine guns influenced new infantry doctrine. The thesis concludes at the end of the First World War as Applin, Brutinel and Parker retired from the military quite soon after the wars end, only Lindsay remained active in military affairs.

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<sup>35</sup> Murray Williamson, Allan R. Millet (eds.), *Military innovation in the interwar period* (New York, 1998), p. 5



## PRIMARY SOURCES AND LITERATURE REVIEW

### OVERVIEW OF PRIMARY SOURCES

The focus of this thesis is on assessing the contribution of four mid-ranking officers in developing machine gun doctrine during the period 1898 to 1918. Archival material generated by and about these individuals forms the main pillars on which the analysis rests. Where relevant and possible, complementary material has been used in an effort to provide a wider conceptual framework within which to locate the assessment of their individual and collective contributions in the short, medium and long term.

Among the few contemporary books on the subject, the most important is *The book of the machine gun* published by Major F.V. Longstaff and Hillard A. Atteridge in 1917.<sup>36</sup> At that time, it was the most comprehensive study of the machine gun undertaken. It covered all aspects of the machine gun up to that period including its early tactical handling. A very comprehensive appendix details all publications up to 1916 on machine guns from all around the world. Longstaff and Atteridge identified John Henry Parker and R.V.K. Applin as major contributors to the debate on machine guns and quoted extensively from their respective works. Although it was finished before the end of the war, this publication has served as a very useful reference manual in the context of this study. Extracts from the book were published as a series of articles in the *Canadian Machine Gunner* a monthly publication produced by the Canadian Machine Gun Corps from its base in Seaford in the UK.<sup>37</sup> V.A. Jackson's *The organization of machine guns and their tactical uses with notes on training* (1910) has been a useful primary source about machine gun tactics of the pre-war army.<sup>38</sup> Its preface by Major General Sir Henry Rawlinson offers a valuable insight into the pre-war thinking of a senior British officer concerning the use of machine guns. C.D. Baker-Carr wrote his autobiography *From chauffeur to brigadier* in

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<sup>36</sup> F.V. Longstaff and Hillard A. Atteridge, *The book of the machine gun* (London, 1917) (hereafter Longstaff & Atteridge, *The book of the machine gun*).

<sup>37</sup> *The Canadian Machine Gunner*. Seaford, UK: Canadian Machine Gun Corps., 1918 (C.W.M. Archives, PER UA 602 C3 C363). The magazine was published from 1917 to 1919.

<sup>38</sup> V.A. Jackson, *The organization of machine guns and their tactical uses with notes on training* (London, 1910) (hereafter Jackson, *The organization of machines guns*).

1930.<sup>39</sup> Baker-Carr's commentary is undermined by the fact that he uses no dates, so it is difficult to verify some of his claims. Baker-Carr made an allegation, that Haig said 'the machine gun is a much overrated weapon, and two per battalion were more than sufficient.'<sup>40</sup> Gary Sheffield, who describes Baker-Carr as a hostile witness against Haig, contends that Haig never said anything like that.<sup>41</sup> Unfortunately, this phrase is still repeatedly attributed to Haig about his attitude to machine guns.

Also indispensable are the works of John Henry Parker, a very prolific author. Starting in 1898, he published *History of the Gatling gun detachment: Fifth army corps, at Santiago, with a few unvarnished truths concerning that expedition*, a year later his *Tactical organization and uses of machine guns in the field* appeared and in 1916 he published his *Trained citizen soldiery: a solution to General Upton's problem*. He also published several other articles covering the full gambit of machine guns doctrine.<sup>42</sup> Such was the extent and influence of his contribution that when Lieutenant Robert C. Cotton in the 1913 edition of the *Journal of the Military Service Institution of the United States* compiled a list of machine gun publications for possible study, of the thirty-nine published in the United States, Parker was credited with authorship of ten books or articles.<sup>43</sup> As the main focus of this thesis is on the development of machine gun doctrine in the British Army, Parker is afforded the least attention. Because his output was widely read by other military personnel around the world, the discussion of Parker relies heavily on his numerous books and articles. Another useful source on American machine gun doctrine during the early war period is a book entitled *Machine guns* published in Texas in 1917 by three U.S. army officers, Julian S. Hatcher, Wilhelm P. Glenn and Harry Malony.<sup>44</sup> The United States Army published a report on the tactics of machine gun operations, based on their observations of the war in France in 1917 entitled *Notes on the use of machine guns in trench warfare and on the training of machine gun units compiled*

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<sup>39</sup> Applin, *Across the seven seas*.

<sup>40</sup> Basil Liddell Hart, *A history of the First World War* (London, 1930), p. 172. The book was originally published as *The real war, 1914-1918* in 1930 and re-issued as *A history of the First World War* in 1970.

<sup>41</sup> Gary Sheffield, *The Chief: Douglas Haig & the British Army*, p. 151.

<sup>42</sup> Parker, *History of the Gatling gun detachment*; idem, *Tactical organization and uses of machine guns in the field* (Kansas City, 1899) (hereafter Parker, *Tactical organization*); idem, *Trained citizen soldiery – a solution of General Upton's problem* (Wisconsin, 1916) (hereafter Parker, *Trained citizen soldiery – a solution of General Upton's problem*).

<sup>43</sup> R.C. Cotton, 'Machine gun references' in *Journal of the Military Service Institution of the United States*, liii, no. 53 (July, Sept., Nov. 1913), pp 467-70.

<sup>44</sup> Julian S. Hatcher, Wilhelm P. Glenn and Harry J. Malony, *Machine guns* (Texas, 1917).

from foreign reports this is a useful primary source.<sup>45</sup> The *Journal of the Military Service Institution of the United States* carried numerous articles on machine guns between 1886 and 1918 which serve as a valuable primary source, many of them penned by John Henry Parker. Furthermore, the War Department produced various pertinent reports on machine guns prior to the war, one of which is particularly relevant to the discussion on Parker, *Selected translations pertaining to the tactical use and value of machine guns* (Washington, 1906) contains references to Parker in featured European military literature and is proof of the dissemination of his theories.<sup>46</sup> Finally, official British documentation supplied to American military authorities in 1917, has been very relevant to this analysis being *Machine gun notes no. 1* (Washington, 1917) and *Machine gun notes no. 2 from British sources* (Washington, 1917).<sup>47</sup>

The primary source for George Lindsay is the archive at the Bovington Tank Museum in Dorset. It details all his work during the war years and is contained in the E2004 series. This archive contains correspondence to and from senior British commanders, Field Marshal Haig, Field Marshal French, Generals Horne, Lucas, Hill and Reddy on all aspects of machine gun doctrine. There are no separate papers kept for Brigadier General Cuthbert Lucas in the National Archives, Kew, Liddell Hart Centre for Military Archives at King's College London or the Imperial War Museum. However, there is a diary for Lucas in private hands but it has not proven possible to access it. Some entries from it have appeared online but these refer mostly to Lucas's time spent in Gallipoli and as G.O.C. of 87<sup>th</sup> Brigade on the Somme in 1916.<sup>48</sup> The Staffordshire Record Office holds the archive for General Sir Walter Norris Congreve. This war diary contains no relevant entries on machine guns or doctrine.<sup>49</sup> Likewise, Congreve did not issue any machine gun instructions while in command of XIII Corps from November 1915 to December 1917 or VII Corps from January 1918.<sup>50</sup> The U.K. National Archives at Kew hold papers on the establishment of the Machine Gun Corps and also the war

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<sup>45</sup> War Department, *Notes on the use of machine guns in trench warfare and on the training of machine gun units – compiled from foreign reports* (Washington, 1917).

<sup>46</sup> War Department Office of the Chief of Staff (Military Information Division, *Selected translations pertaining to the tactical use and value of machine guns* (Washington, 1906)).

<sup>47</sup> War Department, *Machine gun notes no. 1* (Washington, 1917), War Department, *Machine gun notes no. 2 from British sources* (Washington, 1917).

<sup>48</sup> <https://gallipoli100education.org.uk/about-gallipoli-2/soldiers-stories/a-british-officer-at-gallipoli/>  
<http://somme95.blogspot.ie/>

<sup>49</sup> War diary Walter Congreve, (Staffordshire Record Office, Walter Congreve papers, D1057/O/5).

<sup>50</sup> War diaries of XIII Corps W.O. 95/895 to W.O 95/897 and VII Corps W.O. 95/807 at The National Archives, Kew.

diaries of various machine gun units: these are essential for this study.<sup>51</sup> Army, corps and divisional war diaries were also consulted from Kew to cross-reference entries with the relevant machine gun units. Field Marshal Sir Douglas Haig's diaries are also held in Kew in the WO series. Likewise, the cabinet papers for the war period feature numerous references to machine guns. While the Hansard series of parliamentary papers contains valuable references to debates on machine guns and are published online. The Liddell Hart Centre for Military Archives at King's College London hold Lindsay's papers but mostly refers to his post-war work which is outside the scope of this thesis. The British Library contains the war diary of Lieutenant General Sir Alymer Hunter-Weston. Finally, the Imperial War Museum contains an excellent collection of photographs and archive film on machine guns dating from this period. These are available online. Contemporary training manuals are available either in original form or as reprints through the Naval and Military Press Company in the UK. The British Army published Field Service Regulations from 1909 onwards and during the war published over 300 pamphlets on various doctrinal matters. They were published under the series C.D.S. or S[tationery] S[ervice] and eleven of them specifically refer to machine guns. The war diaries of the Australian Imperial Force which are held and digitalised at the Australian National Archives – Australian War Memorial, together with General J. Monash's papers (held and digitalized in the same archive) have also been used in this study.

R.V.K. Applin in 1910 delivered a speech at the Royal United Services Institute (R.U.S.I.), which was subsequently published as an article entitled 'Machine Gun tactics in own and other armies' in a military journal in 1911. Applin detailed the development at that time of machine gun tactics in European countries, the U.S. and Japan. He mentioned the use of machine guns for indirect fire which he claimed was used by the Japanese in the Russo-Japanese War (1904-05). This was to develop into the idea of barrage fire used during the war by the M.G.C.<sup>52</sup> R.V.K. Applin published his autobiography in 1938 entitled *Across the seven seas*. Applin's work is of central importance to this thesis.

A major primary source for Raymond Brutinel are transcripts of radio interviews that he gave in 1962 ('Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun

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<sup>51</sup> Notes on the employment of machines guns and the training of machine gunners, 1915 (T.N.A., W.O., 33/718); Motor Machine Gun batteries, Apr. 1915 (T.N.A., W.O., 158/288), Formation of Machine Gun Corps (T.N.A., W.O., 32/11239); Establishment of Machine Gun Training Centre at Grantham (T.N.A., W.O., 32/5453).

<sup>52</sup> Applin, 'Machine gun tactics in our own and other armies' pp. 1162-1200 (hereafter Applin,

Brigade and their service in the Great War in the Great War', 1914-18) now held in the Canadian War Museum, Ottawa.<sup>53</sup> A transcript of the entire Canadian radio programme aired in 1964 is available on the C.B.C. website and includes contributions by Raymond Brutinel and Andrew McNaughton.

There are two guiding principles that should be followed when dealing with oral history. The first principle is that it should be used in conjunction with surviving contemporary evidence and that recollections of events viewed by an interviewee are deemed more accurate if viewed in the first instance. Peter Hart states that 'oral history is not testimony – a word that provides a wholly unnecessary smokescreen of reverence combined with the sulphurous whiff of legal depositions.'<sup>54</sup> He states that when using oral history you have to be sceptical but also oral history has a place in the history record in that it humanises the record.<sup>55</sup> The Canadian Broadcasting Corporation recorded a radio programme 'In Flanders Fields' in 1964 to commemorate the fiftieth anniversary of the Great War.<sup>56</sup> It was produced by A.E. Powley, and it contained contributions from Raymond Brutinel and Andrew McNaughton among others.<sup>57</sup> The final programme when aired was not without controversy. Teresa Iacobelli maintains that the C.B.C. made mistakes in making the documentary. From listening to the original tapes, she draws the conclusion that the edited final programme was an unfair representation of the actual content of the interviews.<sup>58</sup> She further maintains that the C.B.C. merely made a programme that followed the dominant historiography of the period whereas it had enough material to challenge that view.<sup>59</sup> However, none of the instances where she maintains that the interviews of certain veterans were edited apply to the contributions of any of the quotes used in this thesis.

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<sup>53</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6)

<sup>54</sup> Peter, Hart, *Voices from the Front an oral history of the Great War* (London, 2015) xiv.

<sup>55</sup> Ibid.

<sup>56</sup> Canadian Broadcasting Corporation Digital Archives Flanders Fields radio programme, Canadian Broadcasting Corporation Digital Archives, 1964 transcript.

<sup>57</sup> Teresa, Iacobelli, 'A participant's history?': the Canadian Broadcasting Corporation and the manipulation of oral history' in *Oral History Review*, xxxviii, no. 2, (Summer/Fall, 2011), p. 332. (Hereafter Iacobelli, 'A participant's history?': the Canadian Broadcasting Corporation and the manipulation of oral history') Powley was a former war correspondent for the B.B.C. during the Second World War and went on to become C.B.C.'s special programs officer for history.

<sup>58</sup> Iacobelli, 'A participant's history?': the Canadian Broadcasting Corporation and the manipulation of oral history', p. 337.

<sup>59</sup> Ibid., p. 337. Iacobelli maintains that the historiography of the period followed the work of Alan Clark's *The Donkeys*, A.J.P. Taylor's *The First World War*, in focusing on attacking the supposedly outdated, inept and ruthless leadership of the General Staff.

Raymond Brutinel contributed to the C.B.C. programme and afterwards decided to produce a memoir of the war.<sup>60</sup> With the aid of Mrs F.F. Worthington and A.E. Powley he produced a manuscript but it remained unpublished until 2015.<sup>61</sup> While starting off as taped interviews the work developed with editing by Brutinel, Worthington and Powley using his personal papers and wartime records.<sup>62</sup> From this it can be seen that it transcends merely a memory of an eighty year old former soldier and becomes a much more substantive piece of work. When using Brutinel's memoir in this thesis the entries have been triangulated with the official record contained in the Library Archive Canada whenever possible. There are some obvious errors in Brutinel's recollection and this has been alluded to in the thesis. Peter Hart makes the point that when conducting any form of historical research 'if something is frankly unbelievable then don't believe it without a great deal of solid confirmation – whatever the source'<sup>63</sup>

Also key are the Canadian war diaries which are available through the Canadian Great War Project website, a collaboration involving the National Archives of Canada and the Library and Archives Canada, Ottawa. Brutinel kept meticulous war diaries which contain over 5,000 pages and include extensive correspondence back and forth between Brutinel and senior officers within the Canadian Corps G.H.Q. about machine gun doctrine. Jonathan Boff mentions that the study of war diaries can be problematic as the contents can vary in quality and usefulness.<sup>64</sup> He asserts 'at one extreme, some provide little more than a litany of dates and map references. At the other, some also preserve full copies of all orders received and sent, maps, details of training undertaken, and coherent after-action reports sometimes including a considerable amount of operational analysis.'<sup>65</sup> This can introduce a bias towards those units which have good record keeping but it can also signify a better run unit and this preference cannot be avoided.<sup>66</sup> Raymond Brutinel's war dairies fall into the latter category.

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<sup>60</sup> Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel).

<sup>61</sup> Correspondence between Raymond Brutinel and A.E. Powley, July 1963 – August 1964 (L.A.C. Peter Worthington papers, Correspondence R13880 O-X-E, 45, 10).

<sup>62</sup> Ibid.

<sup>63</sup> Peter, Hart, *Voices from the Front an oral history of the Great War* (London, 2015) xiv.

<sup>64</sup> Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* p. 15.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

The Library and Archives Canada holds the Currie papers which contains personal correspondence between Currie and Brutinel and between Currie and McNaughton which consist of over 120 pages. Plus it contains the Brutinel papers, Borden papers, Clifford Sifton papers, Currie papers, Albert E. Powley papers, Peter Worthington papers all of which have contributed to this thesis. It also is a repository for the war diaries of all the Canadian forces from the First World War. The Canadian War Museum, Ottawa stores an Arthur Currie Archive which contains papers that complement the Currie papers in the L.A.C.

The official Canadian history of the war has been indispensable. Published as the *Official history of the Canadian Forces in the Great War 1914-1919, general series vol. 1 from the outbreak of war to the formation of the Canadian Corps August 1914-September 1915 chronology, appendices, and maps* in 1938, and finished in 1962 by G.W.L Nicholson as the *Official history of the Canadian Army in the First World War Canadian expeditionary Force 1914-1919*, it includes numerous references to Brutinel and the Canadian Motor Machine Gun Brigade.<sup>67</sup> In 1918 a *Report of the Ministry Overseas Military Forces of Canada 1918* was written and a year later published.<sup>68</sup> It was useful for the present study as it features material on the Canadian Machine Gun Corps and the work of Brutinel. The official history of the Canadian Machine Gun Corps was written in 1919 by H.T. Logan and M.R. Levey entitled, *History of the Canadian Machine Gun Corps, C.E.F* and is a very valuable source.<sup>69</sup> J.F.B. Livesay produced a very informative account of the 100 Days Offensive and the role of the Canadian Corps.<sup>70</sup>

The primary sources consulted in this study are wide ranging and consist of various official archives in Canada, Britain and Australia. Some French and German material was analysed through translated documents stored in these archives. The German official history for the year 1915 has been translated by Mark Humphries and John Maker.<sup>71</sup> During the Second World War, the German archives were

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<sup>67</sup> Fortescue A. Duguid, *Official history of the Canadian Forces in the Great War 1914-1919, general series vol. 1 from the outbreak of war to the formation of the Canadian Corps August 1914- September 1915 chronology, appendices, and maps* (Ottawa, 1938); G.W.L., Nicholson, *Official history of the Canadian Army in the First World War Canadian Expeditionary Force, 1914-1919* (Ottawa, 1962).

<sup>68</sup> *Report of the Ministry Overseas Military Forces of Canada 1918* (London, 1918).

<sup>69</sup> Logan, H.T., Levey M.R., *History of the Canadian Machine Gun Corps, C.E.F.* (Ottawa, 1919).

<sup>70</sup> J.F.B. Livesay, *Canada's Hundred Days with the Canadian Corps from Amiens to Mons Aug. 8 – 11 Nov. 1918* (Toronto, 1919) (hereafter Livesay, *Canada's Hundred Days with the Canadian Corps from Amiens*).

<sup>71</sup> Mark Humphries, and John Maker, (eds.) *Germany's Western Front: 1915, Translations from the German Official History of the Great War* (Ontario, 2010).

destroyed so the official history as a primary source assumes a far greater importance than the equivalent allied ones. Unfortunately, development of machine gun doctrine was in its infancy in 1915 so this volume does not contribute much machine gun details to cross-reference with allied sources. The files studied date from the early 1890s to the 1930s and have been consulted in an effort to create a global context for this analysis of innovation in the development of machine gun doctrine.

## LITERATURE REVIEW

The historiography of the First World War has evolved as an abundance of new sources becomes available. Soon after the end of the conflict, unit histories were written, largely by survivors, intent on venerating and remembering their fallen comrades. Some professional writers were commissioned by benefactors to write unit histories to honour dead relatives, an example being Rudyard Kipling's history of the Irish Guards in memory of his dead son.<sup>72</sup> These unit histories were written for public consumption and are purely narrative in nature. They can be useful to the extent that they provide a personal view and are contemporary. In terms of machine guns there were three main unit histories written. G.S. Hutchinson in his book *Machine Guns: Their history and tactical employment (being also a history of the Machine Gun Corps, 1916-1922)*, published in 1938, traces the development and use of machine guns during the First World War.<sup>73</sup> Hutchinson was a lieutenant colonel in the Machine Gun Corps and draws upon his personal experiences to tell the story of the M.G.C. His style of writing resembles that of a novelist. The book is useful as it covers the broad application of the development of the M.G.C. In a book entitled *With the machine gunners in France and Palestine*, published in 1923. J.H. Luxford outlines the history of the New Zealand Machine Gun Corps in the campaigns of the Western Front and in the Middle East.<sup>74</sup> The story of the Canadian Machine Gun Corps was written by C.S. Grafton in 1938 and published under the title *The Canadian "Emma Gees." A history of the Canadian Machine Gun Corps*. It draws

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<sup>72</sup> Rudyard Kipling, *The Irish Guards in the Great War* (2 vols., London, 1923).

<sup>73</sup> Hutchinson, *Machines guns*.

<sup>74</sup> J.H. Luxford, *With the machine gunners in France and Palestine* (London, 1923) (Luxford, *With the machine gunners*).



on the official history of the Canadian Machine Gun Corps by H.T. Hogan and M.R. Marshall-Levey which was published in 1919.<sup>75</sup> Albeit inadvertently these unit histories provide valuable background information on the development of machine gun doctrine and although they were not written as tactical histories they can now be read as such.

Personal accounts penned by soldiers at different times have also been valuable in researching this subject of military innovation. Some were published just after the war to satisfy the public demand for narrative histories; these include *Emma Gees* by Herbert Wes McBride, published in 1918. McBride was an American who joined the Canadian Army at the outbreak of the war and rose to the rank of captain. His book provides an interesting description of his time spent with the 21st Canadian Machine Gun Battalion.<sup>76</sup> A French machine gunner, George Lafond, published his account of the war in 1918 in French as *Ma mitrailleuse* and it was translated in Boston for an American audience as *Covered with mud and glory, a machine gun company in action*.<sup>77</sup> There was another round of personal stories published in the 1970s and 1980s as the soldiers aged and attempted to put their experiences into print before they passed away. Examples include George Coppard who wrote a personal account of his experiences as a machine gunner in the Machine Gun Corps entitled *With a Machine Gun to Cambrai*. The book provides an interesting account of the war from a machine gunner's viewpoint.<sup>78</sup> Other particularly valuable works are C.E. Crutchley's *Machine Gunner, 1914-1918: personal experiences of the Machine Gun Corps*, first published in 1973, and Edward Rowbotham's *Mud, blood and bullets: memoirs of a machine gunner on the Western Front*, published by his daughter in 2010.<sup>79</sup>

Within the corpus of technical books about machine guns, there is considerable variation in quality, ranging from George Chinn's *The machine gun – history, evolution and development of manual, automatic, and airborne repeating weapons*, a

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<sup>75</sup> H.T. Hogan and M.R. Marshall-Levey, *The Canadian "Emma Gees": a history of the Canadian Machine Gun Corps* (Ottawa, 1919).

<sup>76</sup> Herbert W. McBride, *The Emma Gees* (Brooklyn, 1918).

<sup>77</sup> George Lafond, *Covered with mud and glory: a machine gun company in action (Ma mitrailleuse)* (Boston, 1918).

<sup>78</sup> George Coppard, *With a machine gun to Cambrai* (London, 1969) (hereafter Coppard, *With a machine gun to Cambrai*).

<sup>79</sup> C. E. Crutchley, *Machine gunner, 1914-1918: personal experiences of the Machine Gun Corps* (Barnsley, 2005); Edward Rowbotham, *Mud, blood and bullets: memoirs of a machine gunner on the Western Front* (Stroud, Gloucestershire, 2010).

comprehensive study of every machine gun in existence, published in three volumes in 1951 to Roger Ford's *The grim reaper: machine-guns and machine gunners in action*.<sup>80</sup> Dolf L. Goldsmith published two books, *The grand old lady of no man's land: the Vickers machine gun* (1994) about the Vickers machine gun in British service and *The devil's paintbrush: Sir Hiram Maxim's gun* (1989) about the Maxim machine gun in German service.<sup>81</sup> While these deal mainly with technical aspects of machine guns, they also provide useful commentary on the early development of machine guns in the British and German armies.

Also illuminating is John Ellis *The social history of the machine gun*<sup>82</sup> which presents the history of the machine gun as part of social history and concludes that the failure of the British Army to adopt sufficient machine guns represented a significant failure on the part of the officer class. The pre-war officer class was very class conscious and still thought of war as a chivalrous pursuit. Future wars would be won by those who showed the finest offensive capabilities. Technology was played down and if adopted was used to reinforce the offensive. Any weapon seen as aiding the defence was ignored and according to Ellis this is what happened with the machine gun. Ellis's contention is somewhat dated and his view has been challenged by modern research. This research suggests that the British officer corps did adopt modern weapons including machine guns during the First World War.<sup>83</sup> This thesis shows that while the General Staff understood the power of new technology it played it down in favour of emphasising the human factor.<sup>84</sup> In 2001 Eric Brose published *The Kaiser's army: the politics of military technology in Germany during the machine age, 1870-1918* on the Germany pre-war army and how it adopted the new technology of the industrial age. He examined how, for years, there was resistance in the officer corps to technological change which seriously undermined the efficiency of the German army during First World War.<sup>85</sup> Williamson

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<sup>80</sup> George M. Chinn, *The machine gun – history, evolution and development of manual, automatic, and airborne repeating weapons* (3 vols., Washington, 1951); Roger Ford, *The grim reaper: machine-guns and machine gunners in action* (Boston, 1996).

<sup>81</sup> Dolf L. Goldsmith, *The grand old lady of no man's land: the Vickers machine gun* (London, 1994) (hereafter Goldsmith, *The grand old lady of no man's land*); idem, *The devil's paintbrush*.

<sup>82</sup> John Ellis, *The social history of the machine gun* (New York, 1975) (hereafter Ellis, *The social history of the machine gun*).

<sup>83</sup> Tim Travers, 'The offensive and the problem of innovation in British military thought, 1870-1915' in *Journal of Contemporary History*, xiii, no. 3 (July 1978), p. 547.

<sup>84</sup> Ibid.

<sup>85</sup> Eric Brose, *The Kaiser's army: the politics of military technology in Germany during the machine age, 1870-1918* (Oxford, 2001).

Murray contends that to a certain extent, European armies compounded their difficulties during the war by pushing the frontiers of developing technology. Whereas this helped to ease some of the immediate problems confronting the troops, new technological developments also complicated the picture and in the end, the technology played a relatively minor role in the solutions adopted.<sup>86</sup> Anthony Smith published *Machine gun: the story of the men and the weapon that changed the face of war* in 2002.<sup>87</sup> This is largely a work of synthesis and sheds very little fresh or original light on the subject. However, Smith does pose an interesting question as to why the Germans had twenty times more machine guns than the British at the start of the war. The simple answer is that the German army was twenty times larger than the British Army. The most recent book on the subject is Paul Cornish's *Machine guns and the Great War*, published in 2009. It is a good general read, describing the role of the machine gun during the war and examining the symbolism and myths that evolved during the war about machine guns. Cornish examines the development of light machine guns and early automatic weapons which is outside the scope of this thesis. Cornish's is the first significant book solely on the topic of machine guns that is well researched using original sources and therefore is of superior standard to the rest of the general histories of machine guns that have gone before. Cornish does not address the careers of Lindsay, Parker, Applin or Brutinel in any great detail and hence ignores the valuable work that they contributed to the development of machine gun doctrine.<sup>88</sup> Chris McCarthy's short article on the tactical uses of machine guns during the war, published in 1993, is mostly based on the British official history and uses G.S. Hutchinson as his main source.<sup>89</sup> It is general in nature and its relevancy has been diminished over the years with other work being published by Cornish, Travers and Griffith.

Alan Clark published *The Donkeys* in 1961 in which he castigated the British High command for the conduct of the First World War Clark uses the phrase 'Lions led by Donkeys' which has come to imply how the 'so called' incompetent British generals sent the 'poor bloody infantry' to their deaths with no thought for the casualties

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<sup>86</sup> Williamson Murray, *Military adaption in war* in Institute for defence analysis (Alexandria, Virginia, 2009), p. 79.

<sup>87</sup> Anthony Smith, *Machine gun: the story of the men and the weapon that changed the face of war* (London, 2002).

<sup>88</sup> Cornish, *Machine guns & the Great War*.

<sup>89</sup> Chris McCarthy, 'Nobody's child: a brief history of the tactical use of machine guns the British Army, 1914-1918' in *Imperial War Museum Review*, no. 8 (1993), pp 63-71.

suffered.<sup>90</sup> This is the popular image that still prevails in the public mind today. William Philpott believes that this is a dated phrase and should be replaced by ‘citizens led by soldiers’.<sup>91</sup> Likewise, the popular view of machine guns has been reinforced in the public mind by the image of the first day of the Battle of the Somme, when the British Army suffered 57,470 casualties with German machine guns causing a significant portion of them.<sup>92</sup> Scholars have attempted to revise this impression by presenting a much more balanced analysis of the conflict and the leadership. Authors like Paddy Griffith, Tim Travers, Martin Samuels and John Terraine have all written about the tactical development of the British Army before and during the war. Of these, the work of Griffith has been especially ground-breaking and influential in informing the approach and analysis central in the present story. Griffith attempted to address this misconception of the British High Command and show how the British Army adapted and learned lessons during the war in his seminal work on this subject *Battle tactics of the Western Front the British Army’s art of attack, 1916-1918*.<sup>93</sup> Published in 1994, it traces how, from 1916 onwards, the British Army improved its technology and tactics to such an extent that by the end of the war, it had evolved into a superb fighting force, at ease with any tactical dilemma. Griffith devotes a chapter to machine guns and traces the rise of the Machine Gun Corps. He follows a similar theme in a book which he has edited about tactical reform in the British Army. The central contention of this edited volume is that while the B.E.F. in 1914 was tactically naive, by 1918 it had adopted to the demands of warfare by huge improvements and developed some of what would become the standard

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<sup>90</sup> The quote from which the phrase arises is Ludendorff says ‘the English soldiers fight like lions.’ Hoffman: ‘True. But don’t we know that they are lions led by donkeys’. There has been dispute about whether Ludendorff ever said this as it was never found in his memoirs which was apparently the original source. Richard Holmes condemned the use of this phrase when he wrote about Clark’s book. He said ‘it contained a streak of casual dishonesty. Its title is based on the “Lions led by Donkeys” conversation between Hindenburg [sic] and Ludendorff. There is no evidence whatever for this: none. Not a jot or scintilla. Liddell Hart, who had vetted Clark’s manuscript, ought to have known it’, p. 19. Richard, Holmes, ‘War of words: the British Army and the Western Front’, 26, 28 May 2003, Aberdeen and Edinburgh (CRF Prize Lecture, Royal Society of Scotland), p. 19.

<sup>91</sup> William, Philpott, , ‘Beyond the ‘Learning Curve’: The British Army’s Military Transformation in the First World War’ in *Commentary*, 10 November 2009, Europe, History, Land Forces <https://rusi.org/commentary/beyond-learning-curve-british-armys-military-transformation-first-world-war> ( 25 April 2017), Hereafter Philpott, , ‘Beyond the ‘Learning Curve’: The British Army’s Military Transformation in the First World War’

<sup>92</sup> Cornish, *Machine guns & the Great War*, pp 1-4. Cornish notes that artillery amounted for nearly 60 per cent of casualties on the Somme and that while there is no definitive figure for deaths caused by machine guns there is no doubt that they were significant and noted by all who experienced that day.

<sup>93</sup> Paddy Griffith, *Battle tactics of the Western Front: the British army’s art of attack, 1916-18* (London, 1994) (hereafter Griffith, *Battle tactics of the Western Front*).

techniques of combat still in operation today. Griffith's chapter on tactical reform discusses some of the issues that arose in the development of the Machine Gun Corps. He draws attention to the fact that as the M.G.C. evolved during the war it led to problems of cooperation between the infantry and machine gunners. The tactic of barrage fire and separate machine gun battalions led to a potential gulf developing between the infantry and machine gunners. This problem will be explored in detail in the thesis: it will be shown that it was not as big an issue as Griffith claims.<sup>94</sup> Griffith in his writings makes references to the use of machine guns during the war and these will be examined.

The work of Tim Travers is also very pertinent to this study. Travers explores the tactical evolution of the British Army from the 1870s to the end of the First World War and sets out the context in which technology could be used to achieve tactical innovation. In *The killing ground: the British Army, the Western Front and the emergence of modern war, 1900-1918* he attempts to explain why the British Army fought the way it did in the First World War.<sup>95</sup> He also discusses how and why the ideas, tactics and strategies emerged during the pre-war period. In *how the war was won: command and technology in the British Army on the Western Front, 1917-1918*, published in 1992, Travers outlines how the British Army came to realise the importance of new technologies in fighting war and how these technologies were used by the army to achieve final victory in 1918.<sup>96</sup> In an article titled 'Learning and decision making on the Western front, 1915-1918: the British example', Travers explores how tactical change was regulated to junior officers by the General Staff and by understanding this process it is possible to understand how machine guns were dealt with.<sup>97</sup> In another, titled 'Technology, tactics, and morale: Jean de Bloch, the Boer war and British military theory, 1900-1914' he discusses how senior British staff dealt with the idea of new technology and the increase in firepower during the pre-war period.<sup>98</sup> In 'The evolution of British strategy and tactics on the Western Front in 1918', he traces how the British Army had changed its tactics by 1918 and

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<sup>94</sup> Paddy Griffith, 'The extent of tactical reform in the British army' in idem (ed.), *British fighting methods in the Great War* (London, 1996).

<sup>95</sup> Tim Travers, *The Killing Ground the British Army, The Western Front & the emergence of modern war 1914-1918* (3rd ed., Barnsley, 2009).

<sup>96</sup> Tim Travers, *How the War was Won: command and technology in the British Army on the Western Front, 1917-1918* (London, 1992) (hereafter Travers, *How the War was Won*).

<sup>97</sup> Tim Travers, 'Learning and decision making on the Western Front, 1915-1918: the British example' *Canadian Journal of History*, xviii, no. 1 (Apr. 1983), pp 87-98.

<sup>98</sup> Tim Travers, 'Technology, tactics, and morale: Jean de Bloch, the Boer War, and British military theory, 1900-1914' in *Journal of Modern History*, li, no. 2 (June 1979), pp 264-86 (Travers, 'Technology, tactics, & morale').

assesses the part that machine guns played in its new format.<sup>99</sup> Travers provides a good synopsis of the machine gun debate that took place from 1904 to 1914 in the British Army in ‘The offensive and the problem of innovation in British military thought 1870-1915.’ There were two sides to the debate. In the first instance, the General Staff viewed the lessons of the Russo-Japanese War (1904-05) as proof of their theories of the offensive, whereas others posted the view that movement around the battlefield was a matter of firepower. Travers analyses how in the run up to the First World War, the machine gun was ignored as it was seen as a defensive weapon and how the cult of the offensive was promoted.<sup>100</sup> Travers’s ideas about machine gun doctrine are drawn upon throughout this thesis.

Martin Samuels mentions this debate about firepower versus the cult of the bayonet in his discussion about the relative merits of the British and German high command in his book *Command or control? Command, training and tactics in the British and German Armies, 1888-1918*.<sup>101</sup> Also useful is the perspective offered by Dominick Graham and Shelford Bidwell, two artillery officers who discuss the role of machine guns in the pre-war British Army in *Fire-power: the British army weapons & theories of war 1904-1945*.<sup>102</sup> To them, machine guns were part of the development of firepower to the extent that, as artillery moved away from the front line, it was replaced by machine guns. They present a very useful narrative of the development of the pre-war period but this ended at the outbreak of the war, and concentrated on artillery. Their work informs the discussion of machine guns in the pre-war period. A most informative chapter was written by Arnold Harvey in the *Collision of empires: Britain in three world wars, 1793-1945*. In an analysis of new weapons of the First World War, he discusses the machine gun and the place it had in the British inventory. He identifies Major C.D. Baker-Carr as the originator of the M.G.C., a theory that will be discussed in this thesis. The amount of detail is remarkable given that this book is a history of the British Army in three major

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<sup>99</sup> Tim Travers, ‘The evolution of British Strategy and tactics on the Western Front in 1918’ in *GHQ Manpower and Technology, Journal of Military History*, liv, no. 2 (Apr. 1990), pp 173-200.

<sup>100</sup> Tim Travers, ‘The offensive and the problem of innovation in British military thought, 1870-1915’ in *Journal of Contemporary History*, xiii, no. 3 (July 1978), pp 531-53.

<sup>101</sup> Martin Samuels, *Command or control? Command, training and tactics in the British and German armies, 1888-1918* (London, 1995) (hereafter Samuels, *Command or control?*).

<sup>102</sup> Shelford Bidwell and Dominick Graham, *Fire-power: the British army weapons & theories of war, 1904 – 1945* (London, 1982) (hereafter Bidwell & Graham, *Fire power*).

wars spanning two hundred years.<sup>103</sup> John Terraine, while famous for a reappraisal of Field Marshal Haig, has also focussed on the use of new technology during the First World War. In *White heat: the new warfare, 1914-18*, he explores how war was transformed by the development of new weapons and how these weapons were integrated into mainstream battle.<sup>104</sup>

Historians writing in the 1980's developed the idea of a 'learning curve' to suggest that the British Army went through a process of improvement based on combat experience from the time of the Battle of the Somme in 1916 to the successful offensive battles of the Hundred Days in 1918.<sup>105</sup> This school of thought proposed that the British Army had transformed itself fully from a citizen army in 1916 to a fully professional force by the end of the war under the leadership of Field Marshal Sir Douglas Haig. Brian Bond and Nigel Caze, writing in 1999 as editors of *Haig: a reappraisal 70 years on* noted that 'scholarly opinion – with some notable exceptions – is generally moving towards a more favourable interpretation of Haig's achievements – reflecting those of the vast forces he commanded, based on a wider range of sources than those available to earlier polemical writers such as Liddell Hart- and form a more understanding approach derived from a longer perspective and access to a proliferating array of specialist studies.'<sup>106</sup> Bond further suggested that 'our contributors broadly incline to the positive interpretation of the British Army's role, and are more concerned with apportioning credit for the "learning curve" rather than denying its existence'.<sup>107</sup> This idea of the British Army going through a 'learning curve' during the First World War is now being questioned by more modern research. William Philpott writing in 2009, has challenged the idea that the British Army went through a 'learning curve' during the First World War. He has declared that 'the "learning curve" has now had its day, being too vague a concept, and too Anglo-centric a debate, to do justice to the deep-seated rethinking of warfare that occurred between 1914 and 1918.'<sup>108</sup> He believes that the formulation is too one-

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<sup>103</sup> Arnold D. Harvey, *Collision of empires: Britain in three world wars, 1793-1945* (London, 1992) (hereafter Harvey, *Collision of empires*).

<sup>104</sup> John Terraine, *White heat: the new warfare, 1914-18* (London, 1982).

<sup>105</sup> Philpott, 'Beyond the 'Learning Curve': The British Army's Military Transformation in the First World War' Philpott credits that historians at Sandhurst (Paddy Griffith, Paul Harris and Gary Sheffield included) helped coin this phrase in the 1980s.

<sup>106</sup> Peter Simkins, *From the Somme to victory the British Army's experience on the Western Front 1916-1918* (Barnsley, 2014) p. 43.

<sup>107</sup> Philpott, 'Beyond the 'Learning Curve': The British Army's Military Transformation in the First World War'

<sup>108</sup> Ibid.

dimensional and that the ‘learning’ is only one aspect of the process of transformation. He further thinks that the concept of a ‘curve’ assumes a steady rise, whereas what happened in reality was ‘a more up-and-down dynamic process of adjustment to new technologies, more sophisticated and flexible tactics, novel operational doctrines, complex logistics and fundamental change in the systems of command, control, communications and intelligence.’<sup>109</sup>

Jonathan Boff in his book *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*, published in 2012 has proposed three different models of combined arms tactics based on fire power that were practiced by the British Army in the later stages of the First World War.<sup>110</sup> The first school of thought argues that the British Army applied a coherent all-arms tactical design during 1918.<sup>111</sup> The second view, articulated by J.P Harris and Niall Barr denies the existence of a single winning formula and point out that ‘different combinations of arms had to be used to meet rapidly changing circumstances’ and that ‘to think in terms of the constant application of a set formula would be to underestimate the dynamism and complexity of the campaign.’<sup>112</sup> The third group of academics according to Boff take a narrower view of combined arms, only looking at infantry-artillery cooperation and downplaying the role of tanks and aircraft.<sup>113</sup> Boff’s work will prove useful to identify where this thesis fits in terms of modern literature on combined arms. Peter Simkins in his book *From the Somme to victory the British Army’s experience on the Western front 1916-1918* looks at how the British Army developed new theories and practices from the Battle of the Somme to the Hundred Days. The book is written as a series of essays with a common theme of examining ‘the learning curve’ that the British Army followed as it evolved from a small professional in 1914 to to a vastly expanded, increasingly conscript army by 1918, which was able to play a major role in defeating the German Army in the field.<sup>114</sup>

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<sup>109</sup> Ibid.

<sup>110</sup> Jonathan, Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* (Cambridge, 2012) pp 124-5. (hereafter Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*)

<sup>111</sup> Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*, Boff, identifies Sheffield, Todman, Palazzo and Robbins as having similar ideas.

<sup>112</sup> Ibid.

<sup>113</sup> Ibid. According to Boff, the academics involved in this viewpoint are Paddy Griffith, Bill Rawling, Jonathon Bailey and Tim Travers.

<sup>114</sup> Peter, Simkins, *From the Somme to victory the British Army’s experience on the Western Front 1916-1918* (Barnsley, 2014).



Andrew Simpson's work examines the role of the corps command structure as corps developed from being a relatively unimportant, administrative link in the chain of command, to playing a central role in the organisation of operations and acting as the highest level of operational command.<sup>115</sup> In this context, he examined the role of the Corps Machine Gun Officer as a corps resource and makes some important observations, which are relevant to this thesis. David Zabecki analysed the German Spring Offensive or *Kaiserschlacht* (Kaiser's Battle) against the British Third and Fifth Armies. Tactically the battle was a success for the Germans but strategically it was a failure and Zabecki lays the blame on Ludendorff who he believed concentrated on the tactical level of warfare, at the expense of the operational and strategic levels.<sup>116</sup> Zabecki's work provides useful context to explore the work of Lindsay and Brutinel during this period of the war.

Albert Palazzo has produced a detailed account of the use of gas by the British Army during the war.<sup>117</sup> While focussing on gas warfare, he has contributed to our understanding of how the British Army evolved throughout the war by adopting any viable weapon which would assist them in achieving victory. This is relevant to the present study of the development of machine gun doctrine as it highlights the parallel promotion of another new weapon. Stephen Badsey's *Doctrine and reform in the British cavalry, 1880-1918* outlines the development of British cavalry tactics during the period 1880 to 1918.<sup>118</sup> Badsey asserts that cavalrymen of the period struggled to come to terms with the machine gun which seemed to push them towards becoming mounted infantrymen, something that they resisted. The perception is that cavalry became redundant during the war but in fact they did try to come to terms with early mechanised warfare in 1918 when attempts were made by the Canadians under Brutinel to combine them with armoured cars as breakout troops. This attempt at adaptation will be explored in this thesis. Simon Robbins's biography of General Sir Henry Horne demonstrates how he developed new tactics and techniques to deal with unique nature of trench warfare

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<sup>115</sup> Andy Simpson, 'British Corps command on the Western Front, 1914-1918' in Gary, Sheffield and Dan, Todman, command and control on the Western Front the British Army's experience 1914-1918 (Kent, 2004) p. 97.

<sup>116</sup> David T., Zabecki, 'Operational art and the German 1918 offensives' (PhD thesis, University of Cranfield, 2004) p. 279.

<sup>117</sup> Albert, Palazzo, *Seeking victory on the Western Front: the British Army and chemical warfare in World War I* (Nebraska, 2000).

<sup>118</sup> Stephen Badsey, *Doctrine and reform in the British cavalry, 1880 -1918* (Aldershot, 2008), p. 207 (hereafter Badsey, *Doctrine & reform in the British cavalry*).

during his time as commander of the British First Army. However, this excellent book does not draw on the Lindsay archive at Bovington, which is a pity because it would have revealed the relationship that evolved between Lindsay and Horne and Horne's support for machine guns. Robbins does however note that Lindsay acknowledged the support that Horne had given him throughout his career in the M.G.C.<sup>119</sup>

Anthony Saunders thesis 'A Muse of Fire British Trench Warfare Munitions, their Invention, Manufacture and Tactical Employment on the Western Front, 1914–18' deals with the plethora of new infantry weapons that evolved during the war especially grenades and trench mortars. He traces the development of the weapons from invention, design and manufacture into mainstream use. He poses a question as to 'whether the novel munitions of trench warfare contributed to the development of new tactics on the Western Front.'<sup>120</sup> Saunders make the point that weapon technology improvements do not necessarily lead to changes in tactics but merely facilitate modifications in tactics.<sup>121</sup> In the same way, that improvements to machine guns did not necessarily straightaway lead to improved doctrine these new infantry weapons took a while to be accepted. The delay in adopting these munitions was due in main to the fact that these early models were crude and unreliable. Hand in hand with the development of these weapons was the development of the infantry platoon. By 1918, the infantry platoon was an all-weapons unit in which everyone was trained in musketry, bayonet fighting and bombing with grenades aided by new types of munitions.<sup>122</sup> Saunders comes to the conclusion that 'the fighting on the Western Front demonstrated beyond doubt that weight of fire was a factor that had to be considered both technologically and tactically if mobility was to be maintained on the battlefield. This idea emerged from a realisation that the infantry needed more than one type of weapon with which to engage the different sorts of target that it encountered.'<sup>123</sup> Unlike machine guns, there was no new organisation required for

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<sup>119</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* (Farnham, Ashgate, 2010), pp 289-90.

<sup>120</sup> Anthony, Saunders, 'A muse of fire British trench munitions, their invention, manufacture and tactical employment on the Western Front, 1914-18' (PhD thesis, University of Exeter, 2008) p. 252. (hereafter Saunders, 'A muse of fire British trench munitions, their invention, manufacture and tactical employment on the Western Front, 1914-18')

<sup>121</sup> Saunders, 'A muse of fire British trench munitions, their invention, manufacture and tactical employment on the Western Front, 1914-18' p. 268.

<sup>122</sup> *Ibid.*, p. 270.

<sup>123</sup> *Ibid.*, p. 271.

these new munitions. These weapons did not follow the same trajectory as machine guns but rather developed in line with infantry tactics.

Aimée Fox-Godden's doctoral thesis addresses the issue of inter-theatre learning in the British Army during the war.<sup>124</sup> She examines the army's experience in various theatres – Egypt, Gallipoli, Italy, Palestine, Salonika, and the Western Front. In the context of this study, Fox-Godden's work is useful as it shows how the movement of troops between theatres aided the spread of new tactics, and it emphasises innovation by examining the development of logistics, noting how the army brought in civilian expertise when required. Although Fox-Godden does not address machine guns in any way, her work is useful in the context of this study as she shows how the British Army learned and adapted during the war. Stuart Mitchell's doctoral study of inter-disciplinary learning within the 32<sup>nd</sup> Division is also useful as although he only refers to machine guns in a cursory manner, his work helps set the context for this study's exploration of how the machine gun service learned throughout the war.<sup>125</sup>

In terms of the Allied armies, Bill Rawling's book entitled *Surviving trench warfare: technology and the Canadian Corps, 1914-1918*, published in 1992, has been particularly significant.<sup>126</sup> He traces how the Canadian Corps not only adopted the new war technologies but also developed those techniques to use them effectively. Intensive training, specialisation, and close coordination between infantry and artillery helped the Canadian Corps emerge as the main shock force of the British Army. Particularly relevant is Rawling's exploration of how the Canadian's use of machine guns in 'Technology in search of a role the machine gun and the CEF in the First World War'.<sup>127</sup> The Canadians were recognised as innovators in their use of machine guns in the First World War and in his article 'A war of machines – a re-assessment of the Canadian Machine Gun Corps: innovation or tactical expedient', Ian M. McCulloch traces how they developed their tactics during the war. This article provides useful background information for the purposes of this thesis and also refers to Brigadier General Brutinel and his influence on

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<sup>124</sup> Aimée Fox-Godden, "Putting knowledge in power": learning and innovation in the British army of the First World War' (PhD thesis, Birmingham, 2015) (hereafter Fox-Godden, "Putting knowledge in power").

<sup>125</sup> Stuart Bruce Taylor Mitchell, 'An inter-disciplinary study of learning in the 32<sup>nd</sup> Division on the Western Front, 1916-1918' (PhD thesis, Birmingham, 2013).

<sup>126</sup> Bill Rawling, *Surviving trench warfare: technology and the Canadian Corps, 1914-1918* (Toronto, 1992).

<sup>127</sup> Bill Rawling, 'Technology in search of a role the machine gun and the CEF in the First World War' in *Material Culture Review/Revue de la culture matérielle*, xlii (Fall 1995)

(<http://journals.hil.unb.ca/index.php/MCR/article/view/17667>) (12 May 2013).

machine gun tactics.<sup>128</sup> Also useful is Tim Cook's very comprehensive two-volume account of the Canadian Corps in the First World War. However, Raymond Brutinel and his machine gunners are merely commented upon and even then only in a factual manner when in battle while nothing remarkable about machine guns is mentioned.<sup>129</sup> Kenneth Radley's book *Get tough, stay tough: shaping the Canadian Corps, 1914-1918* focuses on the development of Canadian soldiers during the First World War by analysing some of the factors that made the Canadian Corps so effective. By tracking the development of morale and discipline and also the relationship between the officer corps and other ranks, Radley seeks to explain how the Canadian Corps became so successful. While an intriguing read, it sheds no additional light on the machine gun debate.<sup>130</sup> Christopher Pugsley's book *The ANZAC experience: New Zealand, Australia and empire in the First World War* about the Dominion forces in the First World War. While concentrating on the ANZAC forces during the war, it contains a chapter on the learning that went on between the Canadians and Australians and New Zealanders.<sup>131</sup> He maintains that because the Canadians arrived on the Western Front a year earlier, they were able to offer useful advice which was readily accepted by the ANZAC officers who saw themselves as kindred spirits. That is exactly what happened with Applin and Brutinel and it will be addressed in chapter five.

As evidenced by this survey of the literature in this field, all of this academic output about doctrinal reform in the Allied Armies discusses elements of machine gun doctrine in some shape or form. Some authors see machine guns as merely part of the infantry debate and do not focus on it to any great extent. Instead, they place emphasis on their weapons of speciality as opposed to machine guns. However, what is clear is that nobody has written a complete work on machine gun doctrine and hence this thesis aims to address a significant lacuna in the literature on this subject.

There is probably more in print on Brutinel than on any other machine gun officer. *Brutinel: the extraordinary story of a French citizen Brigadier-General in the*

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<sup>128</sup> Ian M. McCulloch, 'A war of machines – A re-assessment of the Canadian Machine Gun Corps: innovation or tactical expedient?' in *Canadian Army Journal*, xi, no.2 (Summer 2008), pp 82-92 (hereafter McCulloch, 'A war of machines').

<sup>129</sup> Tim Cook, *At the sharp end: Canadians fighting the Great War, 1914-1916, volume one* (Toronto, 2007); idem, *Shock troops: Canadians fighting the Great War, 1917-1918, volume two* (Toronto, 2008).

<sup>130</sup> Kenneth Radley, *Get tough, stay tough: shaping the Canadian Corps, 1914 – 1918* (Solihull, West Midlands, 2014).

<sup>131</sup> Christopher Pugsley, *The ANZAC experience: New Zealand, Australia and empire in the First World War* (Auckland, 2004).

*Canadian Army* was published in October 2014.<sup>132</sup> It contains verbatim transcripts of interviews that he gave in 1962 as part of a Canadian radio documentary. As such, it features important first-hand testimony of his war experience. The common problem with all of these books is of course their reliability. As they are autobiographical, they need to be interpreted with caution: yet they do provide a rich primary source for discussion.

Several secondary sources about the lives of these machine gun commanders have also been published. Canadians are very proud of Brutinel and rate him very highly as a military innovator and leader. Yves Tremblay who has a great regard for and contributed a chapter on Brutinel entitled 'Brutinel: a unique kind of leadership' in a military biography of great Canadian commanders from both World Wars.<sup>133</sup> Other Canadian leaders featured in this edition are Sir Sam Hughes, Sir Arthur Currie, General Andrew McNaughton and General Harry Crerar; the calibre of these officers point to the esteem that Brutinel is held. Other Canadian authors have been active in discussing Brutinel and specifically his influence on machine guns during the war. Cameron Pulsifer has published several articles on Brutinel. The first one was 'Canada's first armoured unit Raymond Brutinel and the Canadian Motor Machine Gun Brigades of the First World War' appeared in 2001, and the second one was 'Death at Liscourt: an historical and visual record of five fatalities in the 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 25 March 1918', published in 2002.<sup>134</sup> He published a book entitled *The armoured Autocar in Canadian Service* in 2007. And finally Michael Holden completed an MA thesis entitled 'Constantly shifting and constantly adapting: the tactical exploits of the Canadian Motor Machine Gun Brigades, 1914-1918' at the University of New Brunswick in 2003.<sup>135</sup> All contribute to the knowledge on Brutinel and concentrate on his influence on Canadian doctrine. However, his influence on the British Army is ignored and leaves a gap to be addressed in the thesis. Most of the articles published to date about Brutinel state that he remained in England until June 1916, but the war diary of the 1<sup>st</sup> Canadian Motor

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<sup>132</sup> Dominique Jacques Baylaucq, *Brutinel: the extraordinary story of a French citizen Brigadier-General in the Canadian Army* (Alberta, 2014).

<sup>133</sup> Yves Tremblay, 'Brutinel: A unique kind of leadership' in Bernd Horn and Stephen John Harris (eds), *Warrior chiefs: perspectives on senior Canadian military leaders* (Toronto, 2001) (hereafter Tremblay, 'Brutinel').

<sup>134</sup> Cameron Pulsifer, 'Canada's first armoured unit, Raymond Brutinel and the Canadian Motor Machine Gun Brigades of the First World War' in *Canadian Military History*, x, no. 1 (Winter 2001), pp 44-57; idem, 'Death at Liscourt: an historical and visual record of five fatalities in the 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 25 March 1918' in *Canadian Military History*, xi, no. 3 (Summer 2002), pp 49-64.

<sup>135</sup> Michael James Holden, 'Constantly shifting and constantly adapting: the tactical exploits of the Canadian Motor Machine Gun Brigades, 1914-1918' (M.A. thesis, University of New Brunswick, 2003).

Machine Gun Brigade indicates that he and the brigade were in fact posted to France in June 1915. This error has important implications as it implies that Brutinel and his troops were ignored by senior commanders for a period of over two years. This was not so. While senior commanders struggled to find a task for Brutinel and his mobile unit, they did send him to France early in the war. The source of this misinformation seems to be the Brutinel tapes, when Brutinel himself states that ‘the Motor Brigade was relieved from Coast Guard duties in England and ordered to France – landing in Rouen on the 26th of June, 1916’.<sup>136</sup> This date is then accepted and repeated by subsequent writers, Yves Tremblay among others. This incorrect date calls into question Brutinel himself as a source and is a reminder of the need to crosscheck information gleaned from a variety of sources.

John Henry Parker’s early career was explored by David Armstrong in *Bullets and bureaucrats: the machine gun and the United States Army, 1861-1916*.<sup>137</sup> Armstrong traces the career of Parker from the Spanish American War of 1898 and his attempts to develop machine gun doctrine for the US Army. Armstrong is full of praise for Parker and those arrangements he thought made a lot of sense. According to Armstrong ultimately, Parker did not succeed through no fault of his own but rather through the faults of the American military bureaucracy. Armstrong argues that American machine gun policy was caught up in the politics of procurement and left to stagnate. Passing mention of Parker is featured in *The gun* by C.J. Chivers (London) which is the history of the development of the AK47.<sup>138</sup> Chivers credits Parker with being the first American to realise the significance of automatic weapons but states that he was seen as an attention seeking radical who as a result, was largely ignored by the US Army.

There has a complete dearth of scholarship on George Lindsay, R.V.K. Applin and C.D. Baker-Carr hence the focus on these figures in relation to the development of machine gun doctrine. There has very been little published on George Lindsay and his role in driving innovation in the design and deployment of machine guns apart from an entry in the *Oxford Dictionary of National Biography* by J.P. Harris. R.V.K. Applin has

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<sup>136</sup> Canadian Expeditionary Force Study Group, (<http://www.cefresearch.ca/phpBB3/viewtopic.php?f=26&t=966&start=60>) (11 June 2013) and War diary,

<sup>137</sup> Canadian Motor Machine Gun Brigade, June 1915 (Canadian Great War Project).

<sup>138</sup> Armstrong, *Bullets & bureaucrats*.

<sup>138</sup> C.J. Chivers, *The gun: the story of the AK-47* (London, 2010).

had nothing written about him apart from an entry in Wikipedia. References to C.D. Baker-Carr are mostly in relation to his time spent in tanks in the First World War.

## CHAPTER ONE: THE DEVELOPMENT OF MACHINE GUN DOCTRINE PRIOR TO THE FIRST WORLD WAR

'Whatever happens, we have got the Maxim gun, and they have not.' Hilaire Belloc<sup>1</sup>

### EARLY MACHINE GUNS

Modern machine guns first appeared around the time of the American Civil War, but suffered from mechanical problems. Of these first guns which were manually powered, the most successful was the Gatling gun, patented in 1862.<sup>2</sup> It could fire up to 200 rounds per minute and consisted of six-gun barrels, on a rotating cylinder. As the handle was turned, a gun barrel rotated and was fed a bullet from a gravity hopper situated on top of the gun. The fact that the gun was liable to jam due to the method of feeding ammunition dissuaded potential buyers.<sup>3</sup> Gatling claimed that his invention could save lives, as with his gun, one soldier could do the work of many and hence reduce the size of future armies. Consequently soldiers would not die of exposure and disease.<sup>4</sup> However, Gatling struggled to generate interest in his new invention. Finally, in 1866 the American Army adopted it and in 1867, the British and Japanese Armies purchased some guns for testing.<sup>5</sup> From then on, others placed orders including the Russians, Turks and Spanish.<sup>6</sup>

Similar types of rapid firing guns were also developed in France around this time. In 1851 a Belgian officer, Captain Fafschamps, showed drawings of a rapid-fire weapon to a fellow Belgian, Joseph Montigny.<sup>7</sup> The latter was an engineer and arms manufacturer who made improvements to the earlier design. By 1859 he had persuaded Napoleon III to adopt the gun for the French army. The 'mitrailleuse' as the gun became known translates as 'grapeshot shooter'.<sup>8</sup> All future French machine guns were called mitrailleuse, even though they were not true machine guns. This weapon did not shoot on a continuous basis but rather was a rapid firing volley gun. It was mounted on an artillery carriage and had a

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<sup>1</sup> Hilaire, Belloc, *The modern traveller* (London, 1898) p. 41

<sup>2</sup> Ellis, *The social history of the machine gun*, p. 25.

<sup>3</sup> Ibid,

<sup>4</sup> Ibid., p. 27.

<sup>5</sup> Ibid., p. 29.

<sup>6</sup> Ibid.

<sup>7</sup> Hutchinson, *Machine guns*, p. 10.

<sup>8</sup> Ibid.



rate of fire of about 370 rounds per minute.<sup>9</sup> The French misused the gun during the Franco-Prussian War (1870-71) when it was deployed in such secrecy that the French High Command did not know how to organise it, resulting in a tactical failure. Just at the outbreak of war, the French artillery was reorganised from groups of three six-gun batteries to two groups of six-gun batteries and a battery of ten mitrailleuses.<sup>10</sup> The problem was that the range of the mitrailleuse was roughly the same as that of the French Chassepot rifle – a 1,000 range – and so it did not present any extra advantage to the French troops. Artillery ideally should outrange infantry weapons. But the French replaced part of their artillery with a weapon that could not even reach the Prussians equivalent. During the war there were numerous examples of the mitrailleuses being outranged by Prussian artillery. One instance occurred during the Battle of Spicheren, when a battery of mitrailleuses lasted only minutes against Prussian artillery.<sup>11</sup> However, when circumstances were suitable, the mitrailleuses did prove useful and a prime example is the Battle of Gravelotte.<sup>12</sup> The Prussians attacked in mass formations against well dug in French infantry armed with Chassepot rifles and mitrailleuses. The Prussians suffered over 20,000 casualties but still forced the French to withdraw. Overall, the mitrailleuse was not a success and consequently inventors continued to search for ways to develop a fully automatic machine gun.<sup>13</sup>

Hiram Maxim developed the first truly modern machine gun in 1883.<sup>14</sup> Maxim was an American inventor, who while visiting Vienna in 1882 met a fellow American whom he knew who told Maxim to ‘hang your chemistry and electricity! If you want to make a pile of money, invent something that will enable these Europeans to cut each others’ throats with greater facility.’<sup>15</sup> Maxim did so, and the Maxim machine gun went on to be patented and developed widely by many countries over the next thirty years.<sup>16</sup> However, Maxim found it hard to attract buyers for his new invention and it was a rival gun that was first tested by European armies. The Nordenfelt machine gun was a ten-barrelled, hand-cranked gun offering similar output to the Gatling gun and was clearly

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<sup>9</sup> Longstaff & Atteridge, *The book of the machine gun* p. 10.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid., p. 16.

<sup>12</sup> Hutchinson, *Machine guns*, p. 15.

<sup>13</sup> Ibid.

<sup>14</sup> Longstaff & Atteridge, *The book of the machine gun* p. 23.

<sup>15</sup> Ibid. Longstaff & Atteridge, *The book of the machine gun*

<sup>16</sup> Ibid., p. 29.

inferior to the Maxim, but it had a much better salesman, Basil Zaharoff.<sup>17</sup> The latter was to prove a thorn in the side of Maxim in his attempt to sell his invention and it was not until 1888 when Maxim and Nordenfelt merged their companies that sales of the maxim improve. Zaharoff now began to sell Maxims and it was not unknown for him to bribe officials in his quests for sales.<sup>18</sup> The problem with the first machine guns like the Gatling gun and the Mitraillease was their weight and mode of transport. These guns used artillery carriage, which made them unwieldy, and it was not until fully automatic weapons were introduced that this problem was solved by use of a tripod.

### EARLY MACHINE GUNS IN USE

The first extensive use of modern machine guns by European powers was in their colonial wars in Africa in the late nineteenth century. The British Army deployed Gatling guns in the Zulu War of 1879 at the Battle of Ulundi, and their Commander Lord Chelmsford was greatly impressed by their usefulness

Machine guns are, I consider most valuable weapons for expeditions such as that which we had to undertake in Zululand. . . . They should, however, in my opinion, not be attached to artillery, but should be considered as essentially an infantry weapon.<sup>19</sup>

The first use of Maxims by the British occurred in 1895 on the North West Frontier of India, where they proved very effective against the Ghazis.<sup>20</sup> Thereafter, they were accepted for general use in the British army. In 1896 the British brought machine guns on their expedition to recover Sudan from the Mahdi. At the Battle of Omdurman the Maxims proved very effective as a defensive weapon against the massed attacks of the Mahdists. The German military attaché, Major von Tiedemann observed the battle with the British Army and was most impressed with the new weapon<sup>21</sup>. The problem with machine guns in the British army was that they were identified as a great weapon for use in the colonies but not suitable for a European war.<sup>22</sup>

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<sup>17</sup> Ellis, *The social history of the machine gun*, p. 35.

<sup>18</sup> *Ibid.*, p. 37.

<sup>19</sup> Hutchinson, *Machine guns*, p. 39. Chelmsford refers to the Gatling gun as a machine gun even though it was hand cranked and not a true machine gun.

<sup>20</sup> *Ibid.* p. 65.

<sup>21</sup> *Ibid.*, p. 69.

<sup>22</sup> Applin, 'Machine gun tactics in our own & other armies', p. 52.

Most other European countries also started to adopt machine guns at this time. In 1887, at Queen Victoria's Golden Jubilee, the future Kaiser of Germany, Prince Wilhelm of Prussia, attended a demonstration of a Nordenfelt machine gun by the 10<sup>th</sup> Royal Hussars and was greatly impressed.<sup>23</sup> When a Maxim gun was shown to him in 1884 he was heard to proclaim 'This is the only machine gun.'<sup>24</sup> However, the German High Command was not impressed, based on their experience in the Franco-Prussian War (1870-71). The Germans had dismissed the weapon after seeing the French use it. But by 1899 this lack of interest was reversed and a four-gun Maxim battery was added to each Jager battalion. Between 1905 and 1908 all infantry regiments were equipped with six machine guns in the form of a machine gun company.<sup>25</sup> In order to make best use of new equipment, inter-regimental machine gun competitions were held annually.<sup>26</sup> The French developed a machine gun in 1897, the Hotchkiss. It was gas operated and air cooled which was achieved by wrapping the barrel in large bronze doughnut shaped rings.<sup>27</sup> Air cooling reduced the weight of the gun and made it ideal for use in hot overseas colonies.

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<sup>23</sup> Ibid.

<sup>24</sup> Ibid., p. 55.

<sup>25</sup> Ellis, *The social history of the machine gun* p. 61.

<sup>26</sup> Ibid.

<sup>27</sup> Hutchinson, *Machine guns*, p. 100.



Maxim guns in position between the left battalion of Maxwell's brigade and the right battalion of the British Division.

Figure 1: Maxim guns at the battle of Omdurman 1896.

Source: <http://colonialwarfare18901975.devhub.com/blog/743367-battle-of-omdurman/> (2 Apr. 2015).

As machine guns were increasingly accepted for use in armies, thoughts turned to their tactical use. It was generally accepted that the machine gun was an infantry weapon and should be part of a battalion's equipment. The characteristics of the new weapon were recognised as fire-power, range, mobility and visibility. Most machine guns at the turn of the twentieth century could fire up to 400-500 rounds per minute and keep up a sustained rate of fire.<sup>28</sup> The fire-power of one machine gun in the German army was rated the equivalent of 120 rifles.<sup>29</sup> Using one machine gun had the advantage of controlling the direction and accuracy of fire and in addition the concentration of fire could be maintained. The British Army at the start of the First World War prided itself on the ability of its infantry to fire fifteen aimed shots per minute, but this rapid-fire could only be maintained for a certain period.<sup>30</sup> A well supplied machine gun could continue firing for hours. A machine gun would out range ordinary rifle fire up to a maximum range of 3,000-4,000 metres, this gave the gunners a distinct advantage. Machine guns could also be used to fire indirectly over obstacles using the tripods as support. Early machine guns

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<sup>28</sup> Applin, *Machine gun tactics*, p. 3.

<sup>29</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 94; Applin, *Machine gun tactics*, p. 10.

<sup>30</sup> Graham, 'The British Expeditionary Force in 1914 & the machine gun', p. 191

were mounted on gun carriages, which limited their mobility, but as later models were mounted on tripods, they became more mobile. Continual improvements also reduced their weight, which finally allowed them to be man handled. The German Maxim Maschinengewehr 08 was mounted on a sled, which meant it could be carried by a four-man team rather like a stretcher.<sup>31</sup> Machine guns by their nature presented very small targets and replaced large numbers of troops who would take up a much larger space.

Early war machine gun doctrine was tested in three wars of the early twentieth century. American use was defined by John Henry Parker during the Spanish-American War (1898), British ideas stemmed from the Boer War (1899-1902) and the Russo-Japanese War (1904-05) was observed closely by military authorities from all the major powers. These wars were used by innovators of machine gun doctrine to test their theories and gauge the relative impact of these machine guns in determining the outcome of campaigns. Prior to these wars, there was very little tactical thinking on machine guns. Parker was the only one active at this time in a machine gun service attempted to develop doctrine.

#### JOHN HENRY PARKER 'FOUNDER OF MACHINE GUN DOCTRINE'

The development of the machine gun in the US Army can be attributed to one man, John Henry Parker who became known as 'Gatling Gun Parker' or 'Machine Gun Parker' after his exploits in the Spanish-American War of 1898. Parker developed an interest in Gatling guns on graduating from West Point Academy in 1892.<sup>32</sup> The first major use of machine guns by modern first world powers against each other was the Spanish-American War of 1898.<sup>33</sup> Although mainly a naval conflict, a land campaign was also fought in Cuba during the summer that year. It was the first significant war fought by the U.S. Army since the American Civil War and a rude awakening for the Americans who were badly equipped and led with poor logistics and the campaign resulted in high casualties.<sup>34</sup> The army was equipped with the obsolete Gatling gun, but luckily they were handled by one of the most inventive machine gun pioneers of all time, Lieutenant John Henry Parker. He had attempted to reorganise the Gatling guns into detachments at the

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<sup>31</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 145.

<sup>32</sup> Armstrong, *Bullets & bureaucrats*, p. 118.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid. p. 113.

start of the war, but his idea was rejected by the War Department. Transport to Cuba was scarce and Parker and his guns were nearly left behind. In a show of ingenuity that characterise would his future career he managed to board a transport ship by describing his detachment as security troops for the artillery.<sup>35</sup>

The Americans assaulted the Spanish troops dug into hills overlooking the city of Santiago de Cuba on 1 July 1898. The hills were subsequently named San Juan Hill and Kettle Hill by the Americans. In the ensuing battle, Parker's Gatling guns played a crucial role in the suppression of the Spanish defences, allowing the American infantry to storm San Juan Hill.<sup>36</sup> Once in command of the summit, Parker moved his Gatling guns to the hillcrest where they were used to defeat a Spanish counterattack aimed at the forces of Colonel Theodore Roosevelt who were advancing on Kettle Hill. The Spanish suffered over six hundred casualties at the hands of the Parker's guns.<sup>37</sup> Roosevelt later noted that the hammering sound of the Gatling guns raised the spirits of his men:

While thus firing, there suddenly smote on our ears a peculiar drumming sound. One or two of the men cried out, "The Spanish machine guns!" but, after listening a moment, I leaped to my feet and called, "It's the Gatlings, men! Our Gatlings!" Immediately the troopers began to cheer lustily, for the sound was most inspiring.<sup>38</sup>

Others also commented favourably on the significance of the Gatlings. Trooper Jesse D. Langdon of the 1st Volunteer Infantry, who was part of the attack reported

We were exposed to the Spanish fire, but there was very little because just before we started, why, the Gatling guns opened up at the bottom of the hill, and everybody yelled, "The Gatlings! The Gatlings!" and away we went. The Gatlings just enfiladed the top of those trenches. We'd never have been able to take Kettle Hill if it hadn't been for Parker's Gatling guns.<sup>39</sup>

Roosevelt was very impressed with Parker's tactical handling of the Gatling guns and credited them with saving his 'rough riders' from defeat. He wrote afterwards

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<sup>35</sup> Parker, *History of the Gatling gun detachment*, p. 20.

<sup>36</sup> *Ibid.*, p. 20.

<sup>37</sup> *Ibid.*

<sup>38</sup> *Ibid.*, p. 1.

<sup>39</sup> V.C. Jones, 'Before the colors fade: last of the rough riders' in *American Heritage Magazine*, xx, no. 5 (Aug. 1969), p. 26.

I think Parker deserved rather more credit than any other one man in the entire campaign...he had the rare good judgment and foresight to see the possibilities of the machine guns. He then, by his own exertions, got it to the front and proved that it could do invaluable work on the field of battle, as much in attack as in defence.<sup>40</sup>

This was the first occasion when machine guns were used to suppress the defenders fire, allowing the infantry to advance safely across the fire zone. Later Parker was able to knock out a Spanish artillery piece at a range of 2,000 yards and it was the first time that artillery was destroyed by machine guns.<sup>41</sup> Throughout the rest of the campaign in the siege of Santiago de Cuba, Parker used his Gatling guns to good effect. Having used them as indirect fire support to suppress the Spanish sheltering behind the walls of the city. He became convinced that machine guns could be used in the indirect role and as offensive weapons. Based on that experience Parker believed that machine guns ought to be deployed as a new arm and that were more effective on the open battlefield than artillery.<sup>42</sup> Parker's use of machine guns during the Battle of San Juan hill was a contributory factor in the American victory. He had the nerve and skill to push his guns forward when most needed and used them to good effect to allow the infantry advance across the fire zone. This revolutionary offensive use of machine guns was to become one of the building blocks of his future concepts.

Determined to both further his career and bring to the attention of the public the potential benefits of machine guns, Parker produced *History of the Gatling gun detachment: Fifth army corps, at Santiago, with a few unvarnished truths concerning that expedition* recording his version of the campaign and detailing the capabilities of the machine gun.<sup>43</sup> A publicity campaign in the press supporting the book gave rise to his nickname 'Gatling Gun Parker'. Although he was delighted with the publicity it was

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<sup>40</sup> Theodore Roosevelt, 'The rough riders' in *Scribner's Magazine*, p. 568. Roosevelt was to write the preface for Parker's book *History of the Gatling gun detachment*. This was a friendship that Parker was to call upon in the following years when Roosevelt became president.

<sup>41</sup> Parker, *History of the Gatling gun detachment*, p. 24.

<sup>42</sup> *Ibid.*, p. 27.

<sup>43</sup> *Ibid.*, The book is a typical autobiographical account of his time in Cuba very much focussing on him as the hero. Full of flowery language and daring do it is typical of its time. It was quite common for officers to publish accounts of actions to cater for an inquisitive public. He was a bit naive in his criticisms of senior commanders.

frowned upon by his military superiors.<sup>44</sup> He was deemed to have been overly critical of the War Department in Washington which marked him as somewhat of a troublemaker. Parker dedicated his book to Major General Shafter who had been impressed by the actions of the Gatling Gun Detachment and mentioned Parker in his report on the campaign as did Colonel Roosevelt, however, others were not so supportive and took exception to some of his comments.



Figure 2: John Henry Parker in Cuba.

Source: Parker, *History of the Gatling gun detachment: Fifth army corps, at Santiago, with a few unvarnished truths concerning that expedition.*

Parker was a prolific author in the period 1898-1908 on all aspects of machine guns. He addressed all the elements of doctrine, returning time and time again to refine and refine his ideas. The appointments that he held during this period facilitated this doing so as he was regarded as one of main machine gun authorities in the army.<sup>45</sup> He had

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<sup>44</sup> Edward M. Coffman, *The regulars the American Army, 1898-1941* (Boston, 2004), p. 161. Major General Franklin Bell, made the following comment about Parker to the assistant secretary of war. 'He's a pestiferous, immodest ass, but has much ability notwithstanding and his disagreeable qualities must simply be tolerated for the sake of his usefulness.'

<sup>45</sup> Armstrong, *Bullets & bureaucrats*, p. 113.



identified this weapon as important and was prepared to devote his career to its development. In 1899 Parker produced his seminal text, *Tactical organization and uses of machine guns in the field*, which was based on his experience in Cuba and his knowledge of conflicts in other parts of the world.<sup>46</sup> Here his vision as innovator is elucidated and indeed some of his ideas were visionary particularly in the context of the First World War. He believed that artillery could no longer survive on the modern field of battle and would have to be moved back out of the range of rifle fire. This would leave a void which could be filled by machine guns.<sup>47</sup> This book was the first attempt by any author to develop an integrated machine gun doctrine. The



Theodore Roosevelt Collection, Harvard College Library

Figure 3: Gatling Gun in trenches, San Juan Heights, Cuba.  
Source: Theodore Roosevelt Collection, Harvard College Library.

book detailed the organisation required for machine guns, the tactics that could be used and the command and control systems necessary to operate machine guns efficiently.

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<sup>46</sup> John H. Parker, *Tactical organization*

<sup>47</sup> *Ibid.*

Parker believed that machine guns needed a proper organisational structure. He quite rightly identified machine guns as an intermediate weapon and sought 'to organize machine guns as an independent arm of the service' separate from the artillery, infantry and cavalry.<sup>48</sup> He understood that machine guns could aid the infantry essentially as an aid to advance across the battlefield. In Parker's view, the primary aim of the infantry was to close to bayonet point with the enemy. He believed that machine guns could enable them to do so more effectively provided they were deployed as a separate unit under the command of their own officers.<sup>49</sup> To maximise their efficiency, he argued machine guns must operate independently and move freely over the battlefield. Parker was strongly of the view that 'machine guns should constitute a separate corps, distinct in personnel, in training and in the line of promotion.'<sup>50</sup> He pointed to the experience of the Gatling Gun Detachment in Cuba where the guns were under the direct command of senior commanders as a prime example of how this type of arrangement could work. However, he drew the wrong conclusion from this as the Gatling Gun Detachment was too small a unit on which to base his case for arguing that if scaled up the same command and control system would automatically work.

The establishment of the ideal tactical unit was a prime example of Parker's innovative approach and was crucial to the concept that he developed. Parker believed that each machine gun would need to be manned by one commissioned officer, one sergeant, one corporal, six privates and one driver. He asserted that each regiment should have three guns attached to it and they should be formed into a company. The company would be commanded by a captain with thirty-five men.<sup>51</sup> Parker believed that a three gun company could act independently as single guns or collectively as a group, and he described it as the ideal organisation.<sup>52</sup> According to his model, the next higher grouping should be a machine gun battalion with three companies commanded by a major. Each machine gun company should be attached to a brigade, which at the time contained three regiments of infantry or cavalry. The major should be a brigade commander of the machine guns and would report directly to the overall brigade commander. There would

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<sup>48</sup>Ibid., p. 58.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid., p. 68.

<sup>51</sup> Ibid., p. 89.

<sup>52</sup> Ibid.

also be a requirement to have a battalion of machine guns to act as a corps reserve.<sup>53</sup> Parker thus calculated that for a corps of three divisions, each with three regiments of infantry and three regiments of cavalry plus reserve, there should be thirteen machine gun battalions.<sup>54</sup> Each machine gun battalion would have a complement of 108 men and officers with nine guns. Each division would have 324 men and officers and twenty-seven guns. To equip an army of 100,000 men, Parker argued that 5,460 machine gunners and 599 officers would be required.<sup>55</sup> To oversee this new force the senior officer should be a brigadier general, which post Parker sought for himself. This new machine gun corps would need 585 machine guns including reserves.<sup>56</sup>

The cost of this proposal was enormous both in terms of money and manpower. At the time the U.S. Army was less than 40,000 strong with a small officer corps. To expect that nearly 6,000 men could be assigned to a new service as part of a small peace time army was very naïve. However, Parker was one of the first officers to see the benefits of machine guns and was determined to push forward his ideas. The idea of a separate machine gun organisation was certainly revolutionary, and probably something that could only be developed in a war time situation because of the costs involved. Parker's contribution to machine gun doctrine was, however, ground breaking since it was he who recommended a type of organisation in 1899 that the British Army would develop as the Machine Gun Corps in 1915.<sup>57</sup>

Parker devoted a large part of his book to machine gun tactics, as he was anxious to define these properly. He was a firm believer in the use of machine guns as offensive weapons. This was a radical idea, but he believed that he proved their offensive capability in Cuba. Parker devised tactics to use machine guns in as many situations as possible. He wanted to use machine guns with advance guards and to push the guns as far forward as possible towards the enemy.<sup>58</sup> He sought to adapt the design by using a lighter gun carriage than was used by the Gatlings in Cuba.<sup>59</sup> Parker believed when attaching machine guns to advance guards of cavalry, they proved a valuable weapon to hold

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<sup>53</sup> Ibid.

<sup>54</sup> Ibid.

<sup>55</sup> John H. Parker, *Tactical organization*, p. 117.

<sup>56</sup> Ibid., p. 89.

<sup>57</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239). The Machine Gun Corps was established on 14 October 1915.

<sup>58</sup> John H. Parker, *Tactical organization* p. 89.

<sup>59</sup> Ibid.

ground in the absence of infantry. He described the type of officer that would be required to command a machine gun in action.<sup>60</sup> He needed his officers to be men who never refused to 'go in' because machine guns were very mobile and could retreat if necessary. The commander had to be prepared to accept some losses in men and guns; as Parker remarked 'to make an omelette it is necessary to break some eggs.'<sup>61</sup>

Parker also discussed issues relating to the deployment of machine guns in defence, the tactic with which they were most identified. Other writers regarded machine guns as purely defensive purposes some arguing that they should be sited only in fixed fortifications.<sup>62</sup> Parker took this a stage further and developed ideas for using machine guns defensively in the field. The key to this tactic was how quickly the guns could be moved and brought into action. They also needed to travel with a sufficient supply of ammunition at all times. He wanted his troops to understand the use of ground and cover, so that the machine guns could swing into action at the decisive moment of the battle and cause a break in the enemy line.<sup>63</sup>

Parker described three stages of an infantry attack and how machine guns could play a role at each stage. The first stage consisted of the artillery duel here; machine guns would prove ideal to support artillery by protecting their flanks while they were being set up.<sup>64</sup> Parker was adamant that machine guns could not be a substitute for artillery; rather they should complement it. Once infantry arrived to support the artillery the machine guns could move to a different task.<sup>65</sup> The second stage of the assault saw the infantry advance towards the enemy lines. Here, the machine guns would aid the infantry by firing over their heads as they advanced. This overhead fire is practical due to the nature of the machine gun and the stable platform on which it is mounted. However, this tactic requires well trained gunners and experienced infantry to carry it off. Parker argued that the fire from machine guns is more stable in flight than the artillery of the day and therefore the infantry can have more confidence in this overhead fire.<sup>66</sup>

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<sup>60</sup> Ibid., p. 124.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid. p. 170.

<sup>63</sup> Ibid. p. 171.

<sup>64</sup> Ibid., p. 152.

<sup>65</sup> Ibid. p. 152. He backed up this theory with another example of the use of the Gatlings guns at Santiago when they were used to back the artillery commanded by Major Grimes. This action nearly came to disaster when the Gatlings came under counter battery fire from the Spanish artillery and was forced to withhold fire.

<sup>66</sup> Ibid., p. 153.

The third stage of the attack and the most crucial occurs when the infantry gets close to the enemy's position. This, according to Parker, is 'the supreme moment for the machine guns'.<sup>67</sup> With the enemy occupied with the advancing infantry, the machine gun can push forward to the front of the infantry line and engage the enemy at point blank range. At the range of 600 to 800 yards, the concentrated fire of the machine guns would force the defenders to take shelter at the bottom of their trenches, hence allowing the infantry to close to within yards of the enemy. The machine guns would lose heavily at this stage of the attack, but the firepower would be immense and the moral effect would be even greater.<sup>68</sup> (Parker had been particularly impressed with the moral effect of the guns as experienced at Santiago when the cry went up of 'the Gatlings, the Gatlings' just before the infantry attack was pushed home.)

At the time the U.S. Army was equipped with the Gatling gun which had become obsolete. It was mounted on an artillery carriage which influenced Parker's tactics of pushing them forward in the last throes of an attack. The British found that this did not work when faced with infantry armed with modern rifles during the Boer War.<sup>69</sup> Having said that, what Parker was proposing was similar to what British machine gun theorists would propose in the run up to the First World War. All of them believed that the main infantry weapon was the bayonet and that machine guns could be used to get the infantry safely across the fire zone. Parker in his book was the first to propose such a tactic. To a degree he had proved its potential for success in Cuba during the assault on San Juan Hill.<sup>70</sup> His use of machine gun equipped cavalry holding ground was far in advance of what was proposed by anyone else at the time.

Parker believed artillery tactics required modification. With the greater range and improvement in ammunition, artillery could now reach further and become more destructive. Ranges of less than 1,500 could now be covered by machine guns in the anti-personnel role and

The artillery must cease to be considered as a factor in short range work, and will endeavour to supply by a superior degree of accuracy the long range fire necessary to aid in covering deployments, to knock down block-houses, to destroy walls of entrenchments etc.<sup>71</sup>

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<sup>67</sup> Ibid., p. 156.

<sup>68</sup> Ibid., p. 157.

<sup>69</sup> Martin, Pegler, *The Vickers-Maxim machine gun* (Oxford, 2013) p. 57.

<sup>70</sup> Parker, *History of the Gatling gun detachment*, p. 20.

<sup>71</sup> John H. Parker, *Tactical organization*, p. 191.

This proposal annoyed some artillery officers who felt that Parker was poaching on their turf. He also insulted and called into question the bravery of some of the artillery officers who fought in Cuba. In January 1899 Parker published an article in the *Journal of the Military Services Institution of the United States* in which he insinuated that the artillery, under the command of Captains Best and Parkhurst, retreated from the battlefield after only firing three rounds, leaving the Gatlings guns to hold the field. In fact, the artillery was ordered to retire after firing over 100 rounds.<sup>72</sup> Parker was ordered to retract this statement and duly did so in the next edition of the journal.<sup>73</sup> This episode discredited Parker in the eyes of his superiors and also called into question some of his theories. He was shown to be making false claims to back up some of his theories. The aftermath of the Cuba campaign was a trying time for the US Army. While a victory was secured, it was not without problems in terms of logistics and medical provision. The War Department was facing severe criticism from the public and Parker was adding to the controversy.<sup>74</sup>

Yet Parker had achieved a major milestone through this book. It was the first attempt to define the full range of machine gun doctrine. He addressed the optimum organisation, the tactics required, the command and control issues, the manpower requirements and the training necessary to get the full benefit from machine guns. Unfortunately, his enunciation of his vision fell on deaf ears and his book was ignored, at least in his homeland. However, his writings spread across the Atlantic where he was quoted in articles in Europe.<sup>75</sup> Parker was quoted by several writers in *Selected translations pertaining to the tactical use and value of machine guns* published in 1906 in Europe. Captain E. Vuilleumier of the Swiss Army, writing in the *Revue Militaire Suisse*,

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<sup>72</sup> John H. Parker, 'Uses of machine guns' in *Journal of the Military Service Institution of the United States*, xxiv, no. 1 (Jan. 1899), p. 12.

<sup>73</sup> John H. Parker, 'Uses of machine guns' in *Journal of the Military Service Institution of the United States*, xxiv, no. 1 (Jan. 1899), p. 12

<sup>74</sup> Armstrong, *Bullets & bureaucrats*, p. 116.

<sup>75</sup> R.C. Cotton, 'Machine gun references' in *Journal of the Military Service Institution of the United States*, liii, no. 53 (July, Sept., Nov., 1913), pp 467-70. The influence of Parker on machine gun development was demonstrated by an article by Lieutenant Robert C. Cotton in the 1913 edition of the *Journal of the Military Service Institution of the United States*. Cotton compiled a list of machine gun publications for possible study and of the thirty-nine published in the United States Parker, was credited with ten books or articles.

refers to Parkers' command in Cuba in 1898.<sup>76</sup> A French writer, Lieutenant Dothey, discusses Parker's comments about the use of machine guns as epoch making with regard to tactics in the *Bulletin de la Presse et de la Bibliographie* published in January 1903.<sup>77</sup> R.V.K. Applin discussed some of Parker's theories in his book *Machine gun tactics* in 1910.<sup>78</sup>

Between 1901, when he was appointed a captain, and 1908 Parker worked tirelessly to promote increased machine gun use in the U.S. Army. He did this to the detriment of his career as the machine gun service was seen to be somewhat of a side show to the main services.<sup>79</sup> In 1906 Parker was posted to Cuba and from there he tried to further develop tactical and organisational changes for the machine gun platoons.<sup>80</sup> As part of this effort he wrote a paper outlining the timeline of machine gun development in the U.S. Army and concluded that an experimental unit should be established to determine a new drill. He submitted his report to the War Department concluding with the words it was '... obviously only justice that Captain Parker should have the opportunity to do this work.'<sup>81</sup> The War Department realised that further work was required with machine guns and in December 1907, Parker was ordered to organise a provisional machine gun company at Presidio of Monterey, California. Monterey was the site of a new school of musketry and was to prove a very suitable home for the experimental unit.<sup>82</sup> Parker quickly established the new company which was nicknamed 'the Jackass

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<sup>76</sup> War Department Office of the Chief of Staff (Military Information Division, *Selected translations pertaining to the tactical use and value of machine guns* (Washington, 1906), p. 74 (hereafter War Department, *Selected translations pertaining to the tactical use and value of machine guns*).

<sup>77</sup> *Ibid.*, p. 96.

<sup>78</sup> Applin, *Machine gun tactics*

<sup>79</sup> Armstrong, *Bullets & bureaucrats*, p. 145. Parker was to comment on this lack of advancement on the 2 July 1902 in the margin of a letter he had received from Roosevelt with the words 'But I haven't come in yet, somehow. Neither my service in Cuba, which Colonel Roosevelt, pronounced the most deserving of reward of any officer in the army in his "History of the Rough Riders" nor what I consider my really superior – if less prominent – service in the Philippines, nor yet my efforts to get a practical machine gun carriage made, have yet resulted in advancement by a single file. But I believe President Roosevelt will make it all right in the end'. Parker continued to seek advancement from Roosevelt and Roosevelt was sufficiently impressed with his skills to write back to Parker on 4 May 1900 to say 'if there is any way that I can get you such work I will.' (*The letters of Roosevelt*, xi, 1288) He had recommended Parker to the Secretary of War, Elihu Root, in a letter written on the 14 Aug. 1899. Roosevelt advises Root that Parker was 'well fit for field rank' and that he had considered him for the position of Colonel if he had to raise a brigade. He finished the note with the comment that he could not 'commend him too highly'. (*The letters of Roosevelt*, xi, 1056).

<sup>80</sup> Armstrong, *Bullets & bureaucrats*, p. 155.

<sup>81</sup> *Ibid.*, p. 156.

<sup>82</sup> *Ibid.*, p. 156. Parker received a letter from Roosevelt in December 1907 saying that he 'was very much pleased to give you the chance to organize that machine gun company.'

Battery' after its mode of transport. Parker set to work and one of the concepts that he developed at the time was the idea of indirect overhead fire with machine guns.<sup>83</sup>

According to Parker there were two ways this tactic could be used. One was to use triangulation to find the range and direction of the target and this could be developed with practice by the gunners. The other method was the use of an aiming bar which would translate the readings from the bar to the gun sight. These methods of fire delivery were tested at Fort Riley and the Sandy Hook Proving Ground but did not work as the fall of shot could not be accurately seen unless bare ground was used.<sup>84</sup> This was deemed not to be practical in most instances. However, this tactic was to be used with huge success by the British Army on the battlefields of Northern France within ten years.<sup>85</sup> Here we have Parker independently developing new tactics without any inputs from others, who were thinking along similar lines. Parker's contribution was significant in that he was demonstrating the offensive capability of the weapon long before it became fashionable. In 1904 R.V.K Applin conducted similar experiments while stationed in South Africa.<sup>86</sup>

As part of the training at Monterey the provisional machine gun company participated in field exercises at nearby Atascadero which were reported in the local press.<sup>87</sup> Parker and his 'Jackass Battery' were involved in the testing of a new machine gun for the U.S. Army. This fact was reported by the *San Francisco Call* on 22 October 1908. Under the headline 'Hotchkiss gun is favorite in test' the report recorded a semi-secret trial between the Maxim model 1904 and the Benet Mercié machine gun, a type of Hotchkiss.<sup>88</sup> This test was crucial in the adoption of this new

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<sup>83</sup> Ibid., p. 157.

<sup>84</sup> Ibid., p. 158.

<sup>85</sup> See chapters on Brutinel and Applin

<sup>86</sup> Applin, *Across the Seven Seas*, p. 223.

<sup>87</sup> *San Francisco Call*, 14 Oct. 1908. The *San Francisco Call* reported that 'Captain John Henry Parker and his machine guns carried off the palm for effectiveness, scoring during the day on two squadrons of cavalry, two battalions of infantry and a platoon of field artillery. Besides this, they covered effectively the exposed flanks of the red line and thereby released a regiment of infantry, which then entered upon the main line defence.'

<sup>88</sup> Ibid., 22 Oct. 1908. Parker was approached by the reporter after the test but would express no decided opinion of the results of the test. However, his attitude may be inferred from the fact that he has stated that the adoption of the new weapon would enable him to use twice as many guns with the same personnel and half as many mules as he was using at the time. His principal objection to the new gun was that it has no tripod or other carriage since it was designed to be use from the shoulder, like a rifle. This introduced the firer too prominently into the equation, considering factors such as fatigue, condition of nerves, and so on that could determine the effect of the fire. Clearly, this was less significant when a support is used.



gun for the US Army. Parker's relations with the press was not looked upon very favorably with the military high command and he was criticized by the commanding general of the Department of California, Brigadier General Fred A. Smith over his press associations.<sup>89</sup>

While in Monterey, Parker set about his primary task, which was to produce a machine gun drill manual. He completed this at the end of the summer and submitted his report *Manual of machine gun service for machine guns attached to infantry*.<sup>90</sup> He outlined the organisation required for a separate machine gun company of three platoons, each armed with two machine guns in peace and three machine guns in war. The staff complement would consist of four officers and ninety-five men who would use 108 horses and mules. The manual used this separate organisation as the basis for the drill and tactics. Parker offered two options to the War Department to consider, either to adopt his manual and the machine gun company or to rewrite the manual for the smaller machine gun platoon.<sup>91</sup>

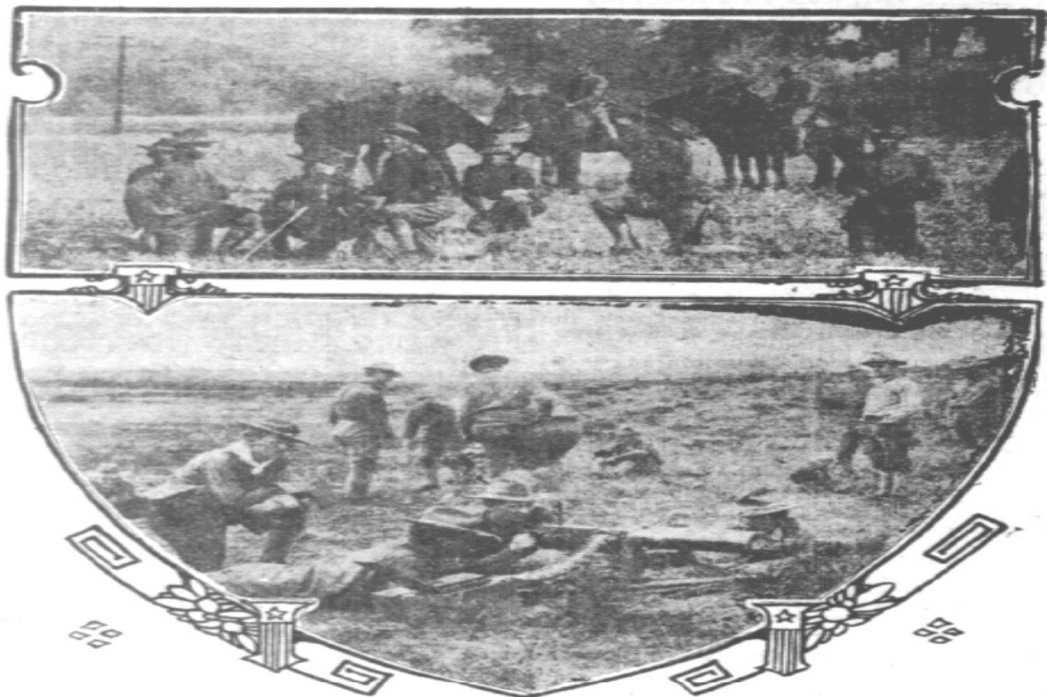
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<sup>89</sup> Armstrong, *Bullets & bureaucrats*, p. 160.

<sup>90</sup> *Ibid.*, p. 161.

<sup>91</sup> *Ibid.*

## Regulars and Militia Gain Warlike Experience in Field



Captain John H. Parker, artillery expert at Camp Atascadero, and the jackass battery in action.

Figure 4: Newspaper picture of John H. Parker's training unit.  
Source: *San Francisco Call*, 4 Oct. 1908.

Parker had kept up correspondence with Theodore Roosevelt who was now President and sent a copy of his proposal directly to him, hence bypassing official channels.<sup>92</sup> The *New York Tribune* reported that Major General Franklin Bell, chief of the General Staff, presented a report by Captain Parker on experiments for a machine gun service.<sup>93</sup> Bell recommended a machine gun company for every regiment of infantry. It was noted that President Roosevelt was interested in the subject and was going to recommend to Congress that such a service be established and an appropriation made for its maintenance.<sup>94</sup> However, just as Parker was making his recommendations to the War Department, the General Staff submitted a report of their own entitled *Organization of machine guns for the United States Army: a discussion of relative value of (1) A Special Corps, (2) Regimental*

<sup>92</sup> Ibid. p. 163.

<sup>93</sup> *New York Tribune*, 27 Oct. 1908.

<sup>94</sup> Ibid.

*Detachments*.<sup>95</sup> The author of the report was Major William H. Johnston who outlined his opposition to a separate service. Because machine guns could not deal with artillery over 2,000 yards and its fire effect was similar to infantry, he had reached the conclusion the machine gun was not powerful enough and could not operate as a separate service.<sup>96</sup> He based his argument on reports from Germany where each army corps and cavalry division had a machine gun detachment of six guns attached. However, he failed to note recent developments whereby the Germans had started to integrate machine gun companies into all infantry and cavalry regiments and place a six-gun detachment under the control of the corps commander.<sup>97</sup> Johnston recommended that the army reject Parker's model and integrate machine guns into organic regimental units.<sup>98</sup>

The War Department now had two conflicting reports to consider. Johnston's report seemed to be favored and Major General William P. Duvall declared that his report showed conclusively that a separate machine gun service was not suitable for the U.S. Army.<sup>99</sup> However, Parker had the support of Roosevelt who used his own experiences in Cuba to argue in support of Parker's concepts. Roosevelt's final proposal which was presented to Congress used ideas from all sources and he looked to establish a machine gun company in each regiment with a separate core of officers who would train and operate these companies.<sup>100</sup> Congress rejected the bill and would not increase the number of officers in the army. This caused the proposal to fail due to the lack of officers to staff the new units. Parker's use of his friendship with Roosevelt to drive innovation is a prime example of what Barry Posen describes as civilian military interactions. Posen maintains that it is the interaction of military mavericks and civilians that drives innovation in the military. According to Posen military mavericks have rejected military authority in that they do not believe that their military superiors understand the innovation proposed to them. This frustration drives them to beyond the bounds of military authority and appeal directly to the

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<sup>95</sup> Armstrong, *Bullets & bureaucrats*, p. 161.

<sup>96</sup> *Ibid.*

<sup>97</sup> *Ibid.*, p. 162.

<sup>98</sup> *Ibid.*

<sup>99</sup> *Ibid.*

<sup>100</sup> *Ibid.*, p. 164.

political class in charge of the military. This is what happened with Parker and Roosevelt during the episode discussed.<sup>101</sup>

Despite his friendship with Roosevelt, Parker's idea of a separate organisation had failed. The army was now faced with the problem of looking for a new drill manual to suit its machine gun platoon. Parker's manual was based on a much bigger organisation so the War Department turned to the School of Musketry to write a manual. Its *Drill regulations for machine gun platoons, infantry, 1909* was issued to all machine gun commanders.<sup>102</sup> There was nothing in the booklet about tactics and it stated that 'machine guns have no independent role in action. Machine gun fire supplements and augments infantry fire, and hence the positions and movements of the machine gun platoon will be governed largely by the positions and movements of the command with which it is serving.'<sup>103</sup>

The development of machine gun doctrine in the pre-war U.S. Army is largely the work of Parker. Throughout this period, he was involved in the whole gamut of doctrine. Yet he largely failed to interest his superiors in the machine gun apart from Roosevelt. Why was this? Partly it was down to the size and the economics of military service in the U.S. The U.S. had a small peacetime army and, with no foreseeable land-based enemies, had no requirement to lavish funds on a redundant army. Most of the military expenditure was spent on the navy rather like Britain.<sup>104</sup> There is also the possibility that some of the lack of interest was due to the personality of Parker. He was very assertive and would not take no for an answer with the result that he alienated people. He was always seeking self-promotion and looking to be rewarded for his work.<sup>105</sup> Parker's manner and apparent self-interest annoyed senior military commanders one of whom, Major General Franklin Bell, made the following comment about Parker to the assistant secretary of war. 'He's a

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<sup>101</sup> For a fuller discussion of Posen's ideas see pages 309-311.

<sup>102</sup> *Drill regulations for machine gun platoons, infantry, 1909* (Washington, 1909),

<sup>103</sup> *Ibid.*, p. 39.

<sup>104</sup> Bidwell & Graham, *Fire power*, p. 39.

<sup>105</sup> Armstrong, *Bullets & bureaucrats*, p. 164. Parker was displeased that he did not get any credit for the manual *Drill regulations for machine gun platoons, infantry, 1909* and complained to Roosevelt, but as the manual was published as an official document under the name of the War Department this was quite normal. Parker was used to getting credit for his writings and felt that he had missed his chance of advancement due to the abandonment of the machine gun company.

pestiferous, immodest ass, but has much ability notwithstanding and his disagreeable qualities must simply be tolerated for the sake of his usefulness.’<sup>106</sup>

What Parker did during this period was to keep revising parts of machine gun doctrine. He realised the need for organisation, command and control, proper guns and tactics, the correct type of recruit and then training. He contributed to all of these elements during this period whilst being virtually ignored by those in authority. Although he did not predict the Great War, he did forecast the future use of machine guns in the war and how they would be deployed. He attempted to develop overhead fire, and also forecasted fire and movement. He wanted to use machine guns to aid movement around the battlefield and was far in advance of others in this regard. Unfortunately, he was ignored by his military superiors in the U.S., partly due to the fact that the U.S. authorities saw no demand for his ideas. Machine gun doctrine in the U.S. army during this period was marked by stagnation, inadequate resources and total neglect.<sup>107</sup> In Parker, the U.S. military had one of the foremost machine gun theorists of the period and yet ignored him and his ideas. However, there were valid reasons for this.

The U.S. Army never had enough machine guns to practice with and such was their mixture of guns that any doctrine developed for one new gun type was not suitable for others.<sup>108</sup> This is the handicap that Parker had to work in. However, he did have a wider influence outside America as R.V.K. Applin introduced his ideas to Britain. What happened in the U.S. during this period was important because it allowed Parker to incubate his innovative ideas. Applin brought these to a wider British audience. Thus, Parker is the originator of a lot of the concepts that the British took up in the war, notably overhead fire and a separate machine gun corps.

#### MACHINE GUN USE IN THE RUSSO-JAPANESE WAR OF 1904-05

Most use of machine guns had been in wars between mismatched opponents, but in 1904 war broke out between two evenly matched enemies. Russia and Japan went to war

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<sup>106</sup> Edward M. Coffman, *The regulars the American Army, 1898-1941* (Boston, 2004), p. 161.

<sup>107</sup> Armstrong, *Bullets & bureaucrats*, p. 214.

<sup>108</sup> Sevellon Brown, *The story of the ordnance in the World War* (Washington, 1920), p. 121. On the outbreak of war in 1914, the US Army had just over 1,200 guns available 670 Benet Mercié machine guns, 285 Maxims model 1904, 350 Lewis machine guns and 143 Colt machine guns.

over disputed territory in China.<sup>109</sup> Both sides were equipped with modern weapons and used them to full effect. Machine guns were to come into their own in this conflict. Defensively the Russians made good use of machine guns inflicting major casualties on the Japanese. At the same time, the Japanese launched and succeeded in major frontal attacks in spite of Russian machine guns. Foreign observers noted this fact and drew the wrong conclusions.<sup>110</sup>

The Russo-Japanese War was reported on widely at the time and attracted a lot of interest in Western military circles. Military authorities raced to send military attachés to observe both sides in the conflict.<sup>111</sup> As the first major conflict between evenly matched armies armed with modern weapons, it was of particular interest. These officers were attached to either the Russian or Japanese G.H.Q.s and had unrestricted access to the battlefield. The reports that they sent back were coloured very much on their own expertise and what part of the conflict they covered. The British Army sent two generals, Lieutenant General Sir Ian Hamilton and Lieutenant General William G. Nicholson, while the future commander of the AEF John J. Pershing represented the US Army. Their professional military observations were published by the military press and they also published their personal memoirs. One such memoir by Sir Ian Hamilton *A staff officer's scrap book during the Russo Japanese War* became a bestseller after the war but never mentioned machine guns.<sup>112</sup> However, in the official report by the War Office, Hamilton noted 'at Shen-tau-pu the enemy made no less than five determined attacks against our entrenchment and its machine gun, and were repulsed each time. The machine gun did great execution, and we have heard, but this is not yet verified, that there were a thousand dead Russians left before it.'<sup>113</sup>

Another British officer, Captain J. B. Jardine of the 5<sup>th</sup> Lancers took note of remarks by various Japanese officers on the use of machine guns at the Battle of Mukden 'All officers are enthusiastic about them. All agree that their role is defence, even at night, and that they are extremely useful in attack. During the Battle of Mukden, machine guns were used very much in the attack by the Japanese, but it seems that the casualties of the

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<sup>109</sup> John W., Steinberg, 'The Russo-Japanese War and world history' in *The Russian Review*, lxxvii, no. 1 (Jan., 2008) p. 1. (Hereafter Steinberg, 'The Russo-Japanese War and world history')

<sup>110</sup> *Ibid.*, p. 3.

<sup>111</sup> *Ibid.*, p. 3

<sup>112</sup> Ian, Hamilton, *A staff officer's scrap book during the Russo Japanese War* (London, 1908)

<sup>113</sup> War Office, *The Russo-Japanese War reports from British officers attached to the Japanese and Russian Forces in the field* (2 vols., London, 1908), ii, 56.

machine gun detachments were very heavy indeed; one commander thought them especially useful in pursuit.<sup>114</sup> Yet another British officer, Lieutenant Colonel A. L. Haldane, reported on the effect of machine guns at the Battle of Mukden

Throughout the campaign in Manchuria the Japanese have suffered severely in attacking those points of the Russian front which have been armed with machine guns, and an episode related by Captain Hart-Synnot, in the account already submitted by him regarding the operations of the 5th Division in the Battle of Mukden, seems to be of interest as showing to what length the Japanese will go in order to silence such weapons. I refer to the daring and successful manner in which a mountain gun, two guns actually, were brought up by them to decisive rifle range of the enemy in order to destroy a machine gun whose presence was materially affecting the prospects of the attack.<sup>115</sup>

He also analysed how the Japanese used machine guns in several other battles, noting that they pushed their machine guns forward into the front line whenever possible but the guns needed to be provided with shields to be totally effective.<sup>116</sup> The British were interested in how the Japanese used cavalry and one officer, Captain J.B. Jardine, observed how the cavalry was equipped with the Hotchkiss machine gun. Jardine was not impressed with the carriage that the gun was carried on, describing it as clumsy, heavy and conspicuous, and he remarked how some crews had fashioned a rough tripod of wood which limited the traversing of the gun.<sup>117</sup>

From these comments it can be seen that the British accumulated a certain amount of information on machine guns during the war. Various officers noted the devastating firepower of the weapons and also how well the Russians used them in defence. Of course there were other modern weapons that came to prominence during this conflict and could be said to have been equally ignored including barbed wire and artillery. In the context of this study however, what is interesting to note is that to a neutral observer machine guns played a prominent role in both attack and defence. Interestingly, the French Army also sent an observer to the Japanese Army, François Oscar de Négrier and while his comments were published in *Lessons from the Russo-Japanese War* immediately after the war, no reference was made to machine guns.<sup>118</sup>

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<sup>114</sup> Ibid., ii, 346.

<sup>115</sup> Ibid., ii, 83.

<sup>116</sup> War Office, *The Russo-Japanese War reports from British officers attached to the Japanese and Russian Forces in the field* (2 vols., London, 1908), ii, 517.

<sup>117</sup> Ibid., ii, 531.

<sup>118</sup> François Oscar de Négrier, *Lessons of the Russo-Japanese war* (London, 1906).

The U.S. Army likewise sent several observers to both sides during the conflict. One of these officers, was Major Joseph E. Kuhn, an engineer, acted as an official observer with the Japanese Army. He described the organisation, the defensive set up, the training and the logistic support of machine guns and noted that by the war's end, the machine gun was highly spoken of by the Japanese officers.<sup>119</sup> Kuhn was also impressed with the Russians use of their Maxims which were mainly deployed in defensive positions:

Machine guns, used sparingly at first, rapidly demonstrated their value and were employed in increasing numbers in the later stages of the war. It seems certain that this weapon will play an important part in the future, and the equipment and tactics of machine guns should receive serious and prompt consideration for our army.<sup>120</sup>

The lessons learned in the Russo-Japanese War with regard to machine guns were articulated in an article in the *Militar Wochenblatt* in June 1908 by an unknown writer who concluded that

The machine guns were extraordinarily successful. In the defence of entrenchments especially they had a most telling effect on the assailants at the moment of the assault. But they also were of service to the attack, being extremely useful in sweeping the crest of the defender's parapets; as a few men can advance under cover with these weapons during an engagement, it is possible to bring them up without much loss to a decisive point. The fire of six machine guns is equal to that of a battalion, and this is of enormous importance at the decisive moment and place.<sup>121</sup>

*The book of the machine gun* published in 1916 by Major F. V. Longstaff and A. Hilliard Atteridge lists a bibliography of relevant unofficial books, pamphlets and articles including fourteen articles or books referring to the use of machine guns in the Russo-Japanese War.<sup>122</sup> The Russo-Japanese War was hugely important as a forerunner for the First World War. It was a war fought under modern conditions with most of the weapons employed in the First World War. Only aircraft, tanks and

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<sup>119</sup> War Department, *Reports of military observers attached to the armies in Manchuria during the Russo-Japanese War, Report of Major E. Kuhn, Corps of Engineers* (Washington, 1906), pp 107-08.

<sup>120</sup> *Ibid.*, p. 230.

<sup>121</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 47.

<sup>122</sup> *Ibid.* p. 139. There are very few references in the book to the Boer War, one merely notes 'in the South African War the machine guns gave disappointing results.'



poison gas would be added later. The use of machine guns was noted by all the observers and it had some impression, but because the Japanese won against a strong defensive system, their devastating effect was somewhat lost.<sup>123</sup> It was realized that machine guns would inflict heavy casualties but the attacker would win out in the end.

R.V.K Applin attempted to draw attention to the use of machine guns in the Russo-Japanese War in his book *Machine gun tactics* and lectures that he conducted in 1910 with varying degrees of success.<sup>124</sup> Applin combined the different experiences from the different military attaches and quoted extensively from them. He analyzed the use of machine gun in the war and came to the conclusion

Sufficient has been quoted to show that both the Japanese and Russians made the greatest use of machine guns in the defence, and that when employed on sound tactical principles they not only afforded material assistance, but were often the predominant factor. On the other hand, when these principles were neglected or ignored, the machine guns merely wasted ammunition and were impotent to affect the situation. The lesson to be learned is this: that machine guns are only useful when their tactical handling is thoroughly understood, and then their effect is more decisive than that of any other arm.<sup>125</sup>

The Russo-Japanese War was observed and debated in the run up to the First World War by all the major military powers. However, there is ample evidence to suggest that European powers tended to use examples from the conflict to confirm existing trains of thought as opposed to developing new ideas. Spencer Jones contends that this was largely true of the British Army, which was concentrating on the lessons learned from the Boer War. According to Jones, the idea of concealing field artillery and the need for close cooperation between infantry and artillery were ideas that the Royal Artillery had observed in South Africa and were confirmed in the Russo-Japanese War.<sup>126</sup>

John Steinberg describes the Russo-Japanese War of 1904-05 as World War Zero in the sense that it allowed new industrialised countries to wage war on an unprecedented

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<sup>123</sup> Applin, 'Machine gun tactics in our own & other armies'

<sup>124</sup> Applin, *Machine gun tactics*.

<sup>125</sup> Ibid., p. 129. Applin quoted extensively from the work of the American Major E. Kuhn, *The Russo-Japanese War reports from British officers attached to the Japanese and Russian Forces in the Field* (London, 1908) and the Japanese General Nogi.

<sup>126</sup> Jones, 'The influence of the Boer War (1899-1902) on the tactical development of the regular British Army 1902-1914' p. 179.

scale.<sup>127</sup> The significance of the conflict to twentieth century history was that it acted as a precursor to the First World War. According to Steinberg the conflict could be seen as a ‘total war’ ‘a twentieth century phenomenon that affected every aspect of a nation’s economic, cultural, and political life, and, once over, had a transforming effect on the politics and societies of both belligerents.’<sup>128</sup> The war was very alike the First World War as it had a similar effect on the civilian population, comparable devastating military casualties and it was likewise financed on the London, Paris and New York financial markets.<sup>129</sup> Observers of the war treated it as a regional conflict while acknowledging the unexpected Japanese victory. Because the war was fought on the far side of the world between a weak European power and a rising Asian nation the lessons learned were downplayed. Steinberg maintains that the army commanders were surprised with how the war developed and had not envisaged the prolonged battles that lasted for days across geographically large battlefields, which generated substantial casualties rather than decisive victory.<sup>130</sup> Steinberg believes that the Russo-Japanese War had all the elements that reoccurred in the First World War. Its origins were linked to the imperial expansion of European powers, its battles were fought with the armaments of the industrial revolution, and neither, the civilian nor the military leadership were prepared for the war that actually occurred in China.<sup>131</sup> Steinberg believes that that the Russo-Japanese War ‘was a modern twentieth-century conflict that offers much evidence revealing the direction in which the policies of the Great Powers, both internal and external, were taking the rest of the world’.<sup>132</sup> This thesis will demonstrate that in terms of machine guns doctrine some of the tactics applied during the First World War had their roots in the Russo-Japanese War.

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<sup>127</sup> Steinberg, ‘The Russo-Japanese War and world history’ p. 1.

<sup>128</sup> Ibid.

<sup>129</sup> Ibid., p. 2.

<sup>130</sup> Ibid., p. 3.

<sup>131</sup> Ibid., p. 7.

<sup>132</sup> Ibid.

## R.V.K. APPLIN AND THE EARLY DEVELOPMENT OF ANGLO-AMERICAN COOPERATION IN MACHINE GUN DOCTRINE

The British Captain R.V.K. Applin in 1910 privately published a book titled *Machine gun tactics* which was based on a lecture he had given at the R.U.S.I. in 1909. This was subsequently published in the *Journal of the R.U.S.I.* in Britain and reproduced in the US in the *Journal of the United States Cavalry Association*.<sup>133</sup> Applin had developed his interest in machine guns from the time he spent as a machine gun instructor in South Africa and Malta. His lecture was the first attempt to bring his ideas to a wider audience; evidently it was deemed of sufficient interest to have it published in both Britain and the US. He was one of the first British officers to address the development of the machine gun in modern warfare and to highlight its possibilities. He subsequently produced a book *Machine gun tactics* which further developed his ideas. Applin explained that he wanted to bring ‘into greater prominence the latent possibilities of the machine gun, and the vital necessity for the most complete organisation and tactical training of the detachments.’<sup>134</sup> This informal exercise of lecturing and book publishing that Applin engaged in was a fairly typical method of doctrinal development in the British Army. Gary Sheffield makes the point that informal lectures in the R.U.S.I. was a key method that the British Army disseminated new doctrine amongst its officer corps.<sup>135</sup> This acts as a form of vertical innovation whereby the officer corps learns outside the formal bounds of military education.

Applin based his ideas on his time in South Africa in 1904 when he was appointed as an instructor at the School of Musketry in Bloemfontein. While there he was able to experiment with machine guns and develop ideas that in later years he would put to good use on the Western Front. He conducted experiments with overhead fire and came to the conclusion that it was safe to fire over the heads of attacking troops two hundred yards in front of the guns when the range was over 1,200 yards and the fire could

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<sup>133</sup> Applin joined the Lancashire Fusiliers as a captain in 1898. He served in South Africa during the Boer War and was twice mentioned in despatches. After the war, he transferred to the 14<sup>th</sup> Hussars and in August 1905 was posted to Malta as D.A.A.G. of Musketry. While in Malta he came into contact with George M. Lindsay who was to become one of the foremost machine gun innovators of the British Army. Based on his experiences in Malta and South Africa, Applin gave a lecture to the Royal United Services Institution in October 1909 entitled ‘Machine gun tactics in our own and other armies’. ‘Machine gun tactics in our own and other armies’ in *Journal of the United States Cavalry Association*, xx, (Sept 1909), pp. 1162-1200

<sup>134</sup> Applin, *Machine gun tactics*, p. v.

<sup>135</sup> Sheffield, ‘Doctrine & command in the British Army’, p. 244.

be kept up until the troops got within two hundred yards of the target.<sup>136</sup> He was also able to develop ideas of indirect fire over a hill at an unseen target using a map and compass for directions and a clinometer to evaluate the gun.<sup>137</sup> He made the comment in his autobiography that

We found out in 1904 all that the Germans taught us at such a cost in 1914, and which culminated in 1917 at Messines, when our 280 machine guns, firing over the heads of our attacking infantry, rained one hundred thousand bullets a minute upon the German trenches with terrible effect.<sup>138</sup>

In his lecture to the R.U.S.I. he addressed the organisation and equipment of machine gun units in various armies. Among the concepts he discussed were the mobility of machine guns, their fire effect, the beaten zone and a comparison with infantry. He was particularly interested in and taken with the German use of machine guns and spoke of the dangers of this development. He described the German organisation of machine guns as far in advance of other nations.<sup>139</sup> Applin concluded his lecture by asking for what ‘purpose do we require machine guns?’ His answer was two-fold:

1. For savage warfare and small expeditions.
2. For a great war against a civilised enemy.<sup>140</sup>

To address the need to utilise machine guns to their fullest extent, Applin claimed that only the best officers should be trained in their use and said ‘I am inclined to doubt the utility of having machine guns at all if they are not commanded and handled by those who are in every way expert in their use.’<sup>141</sup> Applin’s book contained twenty-eight pages on the German use of machine guns which did not go down well with the War Office.<sup>142</sup> According to Applin, the book was reviewed by the War Office and a senior unnamed

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<sup>136</sup> Applin, *Across the seven seas*, p. 223. Applin found the site at Bloemfontein ideal to test some of his ideas. The ground was soft and dusty so the fall of shot could be easily observed. The troops dug trenches and built bullet shelters at the targets so Applin was able to observe the beaten zone of the machine gun bullets at all ranges.

<sup>137</sup> Ibid.

<sup>138</sup> Ibid., p. 223.

<sup>139</sup> Ibid.

<sup>140</sup> Applin, ‘Machine gun tactics in our own & other armies’, p. 52.

<sup>141</sup> Ibid., p. 53.

<sup>142</sup> Applin, *Across the seven seas*, p. 227. *Machine gun tactics* was first published in 1910 and went through several editions. The last version, published in 1915, was amended by Applin to reflect changes caused by the war, but he noted with satisfaction that some of his recommendations had already taken place and the book did not require to be amended, notably with regard to the brigading of machine guns.

general made the comment to him years later ‘I was asked by the Chief of the General Staff to read your book and report on it. I told him that it was before its time and should be put away for ten years.’<sup>143</sup> However, notwithstanding the cool response in Britain, most of the first edition was bought by the American Army who adopted it as a textbook.<sup>144</sup> This rejection of Applin’s book was a prime example of innovation at work. Adam M. Jungdahl and Julia M. Macdonald argue that the hierarchical structure of military organisations allows certain individuals to develop expertise and opinions to such an extent that they can hold back innovations.<sup>145</sup> In this instance Applin’s ideas were blocked by one such unnamed inhibitor or gatekeeper. This was also true of Parker in America where his work was rejected.

While Applin drew inspiration for his book and lecture from his own experiences in South Africa and Malta as an instructor, he also quoted from other authors and in particular the American, John Henry Parker. He quoted from Parker’s book *Tactical organisation and uses of machine guns in the field* which had been in circulation since 1899.<sup>146</sup> Both Applin and Parker dealt with similar themes, one of which was the idea of pushing machine guns forward with cavalry. Machine guns were very useful in this situation where they could provide enhanced firepower to the lightly armed troopers. Applin went even further than Parker when he suggested that the machine gun was essentially a cavalry weapon which would allow cavalry to once more become independent.<sup>147</sup> One of Parker’s ideas that Applin picked up and expanded on was the notion that the infantry were no longer the major producer of the volume of fire.<sup>148</sup> Machine guns would now do this work. The infantry were now free to return to be the contact weapon. Parker summed this problem up in the following manner

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<sup>143</sup> Ibid., p. 227. Applin described the unnamed general as a ‘distinguished General who was then a Member of Parliament’. *The Times*, 22 February 1924. One such person who fits the description is Brigadier General John Sanctuary Nicholson. Nicholson served in the British Army during the Boer War and from April 1915 to December 1918 was Base Commandant at Calais. Both Applin and Nicholson stood for election in the same constituency in Westminster in 1921 as ‘Anti Waste’ candidates where Nicholson was successful. He died in 1924 from pneumonia and left no papers. A British Pathé film clip is available of Applin and Nicholson together during the election at <http://www.britishpathe.com/video/all-anti-wasters/query/Lieutenant>

<sup>144</sup> Ibid., p. 227.

<sup>145</sup> For a fuller exploration of Jungdahl’s and Julia M. Macdonald’s ideas see pages 354-60.

<sup>146</sup> John H. Parker, *Tactical organization*

<sup>147</sup> Applin *Machine gun tactics*, p. 57.

<sup>148</sup> Parker, *Tactical organization*, p. 186.

The latest previous problem was how to maintain cohesive fire action in the fire swept zone. The new problem is to pass through the danger zone as rapidly as possible, firing as little as possible, and then mass as heavy a line as possible at the most favourable position for the final charge.<sup>149</sup>

Applin's solution to this problem was to use machine guns to deliver the volume of fire in the attack and he wrote

Machine guns will co-operate with the attacking infantry in the decisive fire action in endeavouring to obtain a superiority of fire.... at the decisive stage of the attack, fire of the greatest intensity should be continued as long as is compatible with the safety of the advancing firing line.<sup>150</sup>

Both men were concerned with the same problems. They both agreed that only the best officers and men should be recruited for machine gun service. Parker described a good machine gun man as 'the very highest type of the modern soldier. The functions he must perform are so varied, his field of usefulness is so large, that he must have special training for his work. He must thoroughly understand the tactical uses and possibilities of all the other arms, and the peculiar usefulness of his own in relation to each of them.'<sup>151</sup> Applin was of a similar mind, stating

The best and nothing but the best is necessary to the successful employment of machine guns, and the importance of obtaining the very best officers as section commanders is so great that there is reason to doubt the utility of having machine guns at all if they are not commanded and handled by those who are in every way expert in their use.<sup>152</sup>

While both Parker and Applin had similar ideas and concepts and although some of their theories appear similar, it is not being suggested here that Applin copied Parker. Rather he used ideas which were in the general domain and applied his own reasoning to them. That some of their ideas are similar is probably to do with the capabilities and characteristics of machine guns that allow different people to come up similar ideas.<sup>153</sup>

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<sup>149</sup> Ibid.

<sup>150</sup> Applin, *Machine gun tactics*, p. 232.

<sup>151</sup> Parker, *Tactical organization*, p. 71.

<sup>152</sup> Applin, *Machine gun tactics*, p. 232.

<sup>153</sup> E.L.N. Glass, *The history of the tenth cavalry* (Arizona, 1921), p. 92. The history of the US 10<sup>th</sup> Cavalry notes that one of the American authors quoted by Applin, Lieutenant Albert E. Phillips developed indirect machine gun fire in 1908 while the machine gun platoon of the 10<sup>th</sup> Cavalry was stationed in the Philippines. This tactic was used by the 10<sup>th</sup> Cavalry in Mexico in 1916 at Aquas Calientes to cover an attack by infantry

While opinions on Applin's book and lecture were mixed, his contributions were nonetheless deemed to be thought provoking. Major F. V. Longstaff described the lecture as the best ever given on machine gun tactics in the R.U.S.I., while in 1917 he also described the book as prophetic in many of the tactics that it expounded, which had come to pass during the war.<sup>154</sup> Colonel W. N. Congreve chaired the lecture, was very supportive of Applin, and commended him for the lecture which he described as producing useful discussion.<sup>155</sup> Like Applin, Congreve was concerned with foreign developments and believed that the British Army was falling behind. Regarding Applin's lecture, he commented on the use of overhead fire and felt that a greater safety margin was needed to reassure the troops. He was also convinced that Applin had missed a point which was how to attack machine guns. His comments are very thoughtful and visionary:

He has not told us much about how we are to meet them, that is to say how we are to attack them, to knock them out, or neutralise them. That, for the majority of us, is a greater consideration than the actual handling of the guns themselves. I think if a company officer comes to realise that a machine gun at a thousand yards can produce an absolutely annihilating effect on a suitable target he will appreciate how greatly his responsibility is increased. At present I am perfectly convinced we do not realise that.<sup>156</sup>

Congreve thought that there was apathy towards machine guns from senior officers which led, he believed to deplorable results at manoeuvres and field trials.<sup>157</sup> In the lecture Applin was particularly interested in how machine guns were organised in foreign service and he described in great detail how machine guns would revolutionise the fire power of infantry. He was determined to bring to the attention of all how machine guns were used in the Russo-Japanese War, and to discuss the principles that would determine their future use. He addressed infantry and cavalry tactics of machine guns and was quite happy to be queried on his theories.<sup>158</sup> He was adamant that machine gun fire was only useful if it was effective and that machine guns were essentially a cavalry weapon which had been

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when under the command of Captain Phillips. The claim by E.L.N. Glass shows how the same tactics could be independently arrived at by different people based on the characteristics of the machine gun itself.

<sup>154</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 294. Longstaff attended the lecture in 1910 and years later in 1917 wrote the most definitive book on machine guns published to date after being invalided out of the army.

<sup>155</sup> Applin, 'Machine gun tactics in our own & other armies', p. 1199.

<sup>156</sup> Ibid.

<sup>157</sup> Ibid.

<sup>158</sup> Ibid.

recognised by foreign powers. However, this had been ignored in the British cavalry, where (according to Applin) most officers viewed machine guns as unnecessary encumbrances.<sup>159</sup> Applin wanted to use machine guns to bolster the fire power of cavalry and hence allow them to return to their mobile method of warfare. Other themes that Applin mentioned included what he described as his golden rule – ‘conceal your guns, utilise cover, and operate by surprise – for surprise is the essence of tactical success.’<sup>160</sup> He warned that machine guns had to be protected from artillery and came to the conclusion that a machine gun was equivalent to fifty riflemen.<sup>161</sup>

This lack of enthusiasm for machine guns on the part of cavalry officers has been well documented. Stephen Badsey describes two incidences that he was aware of when senior Cavalry officers dismissed machine guns. The first occurred when Lieutenant Spears made the mistake of telling Brigadier General Kavanagh that he had wiped out the 1<sup>st</sup> Cavalry Brigade twice over at an exercise at Aldershot when in command of the Brigade’s machine guns. Kavanagh denounced him for the lack of cavalry spirit and made him walk home.<sup>162</sup> The second incidence recounted by Badsey (who admits it is more apocryphal) tells of a junior officer who failed to read his superiors minds while on exercise, regarding the deployment of machine guns is rebuked by his commanding officer in the following address ‘can’t you see I’m busy? Take the damn things to a flank and hide them!’ which of course was the correct thing to do.<sup>163</sup> Major F.V. Longstaff recounted a debate at the R.U.S.I. when an unnamed distinguished cavalry officer declared ‘that a machine gun would be a nuisance with a cavalry regiment, whose commander had already quite enough to think about of in handling his squadrons in action.’<sup>164</sup> However, as well as Major General Sir Douglas Haig, one cavalry officer stands out in his support for machine guns. In 1910 Major General Edmund Allenby wrote

The question of machine guns might be studied by the cavalry nowadays, because I do not think we make sufficient use of them. The weapon is not properly understood, and I think that, whether in fire tactics or in the tactical use of the

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<sup>159</sup> Applin, ‘Machine gun tactics in our own & other armies’, p. 1183.

<sup>160</sup> Applin, *Machine gun tactics*, p. 56.

<sup>161</sup> Ibid.

<sup>162</sup> Badsey, *Doctrine & reform in the British cavalry*, p. 207.

<sup>163</sup> Ibid., p. 207

<sup>164</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 56.



weapon, we have hardly yet made a beginning. Personally I believe it is going to have an enormous future before it.<sup>165</sup>

Within the cavalry there was an ongoing debate about whether cavalry should fight mounted or dismounted. In 1907 a new *Cavalry Training* was issued. It stated ‘In modern war numerous difficulties will present themselves which cannot be overcome by mounted action, and which demand the employment of rifle fire.’<sup>166</sup> But a later passage then stated ‘It must be accepted as a principle that the rifle, effective as it is, cannot replace the effect produced by the speed of the horse, the magnetism of the charge, and the terror of cold steel.’<sup>167</sup> According to Badsey, these passages have been attributed to Haig when he was Director of Military Training and have been seized upon by his opponents as proof of his lack of tactical awareness prior to the war.<sup>168</sup> The debate concerning mounted versus dismounted action continued throughout the pre-war period. There was an appreciation that cavalry were vulnerable to rifle fire and needed weapons to deal with this situation. Cavalry were armed with machine guns but there was confusion as to what to do with them. Just as for its infantry counterpart, there was little in the cavalry manual to give guidance on the use of machine guns. In order to use machine guns, cavalrymen had to dismount, so those opposed to dismounted cavalry action disliked machine guns as seeing them as forcing them to fight dismounted. Applin’s view on cavalry machine guns therefore did not find much favour.<sup>169</sup> He thought that there were two conflicting aims for using machine guns. The first was in a colonial policing role and the second was in large-scale European conflict. In order to achieve these two conflicting aims, Applin proposed that machine guns should be organised in batteries in peacetime and trained under a senior officer with experience of machine guns.<sup>170</sup> When in action, the guns of individual battalions should be grouped or brigaded together under the selected field officer thereby allowing them to be used in the most efficient manner.<sup>171</sup>

Parker’s and Applin’s books had similar impact in that they were ignored by senior officers.<sup>172</sup> After Applin’s book appeared there was no amendment to any official tactical

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<sup>165</sup> Ellis, *The social history of the machine gun*, p. 59.

<sup>166</sup> Badsey, *Doctrine & reform in the British cavalry*, p. 211.

<sup>167</sup> *Ibid.*, p. 211.

<sup>168</sup> *Ibid.*, p. 210.

<sup>169</sup> See comments exchanged between General Kavanagh and Lieutenant Spears.

<sup>170</sup> Applin, ‘Machine gun tactics in our own & other armies’, p. 1186

<sup>171</sup> *Ibid.*

<sup>172</sup> Applin’s book was referenced in the *Encyclopaedia Britannica* (1911) which would have broadened its exposure.

document. No special training for machine gunners was developed. No separate officers appointed to look after the machine guns and there would be no brigading of machine guns. Neither was the use of machine guns as offensive weapons as proposed by Applin developed further. A British General Staff conference in 1909 discussed the training of machine gunners. Brigadier General A.J. Murray, Director of Military Training, declared that he had 'always been a warm advocate of the extended use of machine guns. I do not think we have got the best value out of them: but compared with others Powers (Germany has gone tremendously ahead during the last few months), I think we have a proportionate number of machine guns to put in the field; but we have not sufficiently and scientifically studied them.'<sup>173</sup> Murray then discussed the training of machine gunners and noted that the issue of ammunition for training purposes was discussed at the War Office. The Chief of the General Staff, General Sir William Nicholson, allocated 3,500 rounds per gun per year and thought that was sufficient, even if it fell short of allocations authorised in other Powers.<sup>174</sup> Brigadier General Rawlinson agreed with Murray but wanted a blank firing attachment for training purposes which would allow machine guns to be noticed at manoeuvres. Rawlinson finished his contribution by stating 'I am quite certain, and I think those who were in Manchuria will bear me out, that the machine gun in the future is going to be of great importance in war.'<sup>175</sup> Colonel Davies, speaking on behalf of General Smith-Dorrien, stated that a 'machine gun officer' should be appointed to oversee the training of machine gunners but report to the brigadier.<sup>176</sup> Major General Haig agreed with Murray and Rawlinson and said that machine gun training should be conducted on artillery ranges, he continued 'I have taken a good deal of interest in machine guns, and it struck me that on the ordinary range there is no training for war.'<sup>177</sup>

The annual General Staff conference held in 1910, also discussed the training of machine gun detachments. At the conference Brigadier General W.R. Robertson, speaking on behalf of General Sir Horace Smith-Dorrien, stated that he was not in favour of permanently brigading machine guns and that he thought that all the divisional and brigade commanders at Aldershot held the same view.<sup>178</sup> He declared that 'opportunities

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<sup>173</sup> Chief of the General Staff, *Report of a conference of General Staff officers at the Staff College, 18<sup>th</sup> to 21<sup>st</sup> January 1909* (London, 1909) p. 65).

<sup>174</sup> *Ibid.*, p. 66.

<sup>175</sup> *Ibid.*, p. 67.

<sup>176</sup> *Ibid.* p. 67.

<sup>177</sup> *Ibid.*, p. 68.

<sup>178</sup> *Ibid.*, p. 29.

for using machine guns are fleeting and frequently local, and if the guns are normally brigaded it will often prove impossible to take advantage of these opportunities.<sup>179</sup> Training of machine gunners was to be the responsibility of the brigade commanders. Another officer, General Herbert Belfield, stated that it was the battalion commander who should be responsible for the technical training and the brigadier should be responsible for the tactical training.<sup>180</sup> An American contemporary writer of machine guns quoted extensively from Applin's book. Lieutenant Harry J. Malony of the 26<sup>th</sup> Infantry authored a section of a book entitled *Machine guns* in 1917. It was a collaboration by three American officers and Malony quoted extensively from Applin's *Machine gun tactics* to support his case for better use of machine guns. Evidently Applin had a bigger influence in America than in his native Britain where his work was virtually ignored. He introduced Parker's ideas to Britain and in turn was himself quoted extensively by Malony in America. This transfer of ideas was not sanctioned or formalised by senior officers but happened outside normal military exchanges. Both Parker and Applin published independently of military authorities and both suffered the fate of being ignored during this pre-war period.

#### THE MACHINE GUN IN THE PRE-WAR BRITISH ARMY

Spencer Jones's thesis on the Boer War discusses how the British Army used machine guns during the conflict.<sup>181</sup> The machine gun experience for the British Army in the Boer War was mixed. The Boers fought from behind cover and refused to provide the kind of ideal target that previous colonial enemies had presented for the British Maxims. Spencer Jones maintains that the tactical problem of employing machine guns in the Boer War was never solved.<sup>182</sup> Some officers wanted to push the guns forward with the infantry in order to engage the enemy up close and give moral support to the infantry whereas others felt bringing the guns so far forward made it too easy a target for the Boers to silence with either rifle or artillery fire.<sup>183</sup> At the Battle of Modder River, the machine guns of the 1<sup>st</sup> Scots Guards were pushed forward only to be destroyed in less than five

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<sup>179</sup> Ibid.

<sup>180</sup> Ibid., p. 30.

<sup>181</sup> Jones, 'The influence of the Boer War (1899-1902).

<sup>182</sup> Ibid., p. 85.

<sup>183</sup> Ibid.

minutes by Boer pom-pom fire.<sup>184</sup> Reliability was also a problem, with guns jamming and breaking down frequently throughout the campaign.<sup>185</sup> Jones writes that the common view amongst British officers that ‘while the gun was valuable in both attack and defence against enemies who operated in dense masses, it was only useful in defence against opposition who made use of cover and entrenchment.’<sup>186</sup> In the aftermath of the war apathy reigned with regard to machine guns and ‘a 1901 committee assembled to assess the value and organisation of machine guns and pom-pom guns in the future ignored its remit and omitted discussion of the machine gun altogether.’<sup>187</sup> In 1910, one officer summed up the problem of the gun’s poor reputation:

No doubt this is due very largely to the discredit into which the Maxim gun fell in South Africa... they were perfectly useless and had to be abandoned; had we known as much about it as we do now different tactics would have prevailed... The way the guns are handled on manoeuvres, the way they are attacked, leads one to believe that people take very little account of them. At present half the mistakes in the training at manoeuvres are due to no-one knowing where the machine gun is, and certainly not caring.<sup>188</sup>

An unnamed instructor from the School of Musketry, Hythe put down the failure of the machine gun during the Boer War to ‘want of knowledge of tactical handling and a low standard of training of the personnel. Other reasons were unsuitable targets offered by the Boers, and the carriage mounting.’<sup>189</sup> The instructor also maintains that because of its poor performance the machine gun ‘fell into further disrepute’ with official army circles.<sup>190</sup> The disappointing performance of the machine gun in South Africa, Jones maintains meant that in the aftermath of the war, the weapons were neglected by the army as a whole, with just a handful of advocates arguing for greater employment.<sup>191</sup> The fact that the weapon had performed so badly against a civilised enemy did little to improve its reputation as merely a weapon of opportunity or to encourage its further development.<sup>192</sup> Overall, the Boer War experience was largely negative with regard to machine guns. Whatever the

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<sup>184</sup> Ibid.

<sup>185</sup> Ibid.

<sup>186</sup> Ibid.

<sup>187</sup> Ibid., p. 86.

<sup>188</sup> Ibid.

<sup>189</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 139.

<sup>190</sup> Ibid.

<sup>191</sup> Jones, ‘The influence of the Boer War (1899-1902) p. 87.

<sup>192</sup> Ibid., p. 87.

experience of the machine gun in the Boer War evidence for the improvement of infantry marksmanship and firepower was provided.

The Russo-Japanese War tended to confirm rather than dispel these ideas from the Boer War. The successful Japanese assaults of Russian trenches posed a counterpoint to the post-Boer War British concept that direct assaults against modern weapons would be useless. Furthermore, the Russo-Japanese War was seen as more applicable to a European context than the Boer War, being fought between evenly matched opponents equipped with modern tactics and equipment.<sup>193</sup> In hindsight, it is clear that the war showed the supremacy of firepower and the value of entrenchment. At the time this lesson was not so clear.<sup>194</sup> Instead, a consensus arose on the continent that the war demonstrated the power of the attack over static defence and that while firepower had increased in volume valour and acceptance of casualties would ensure success.<sup>195</sup> Jones argues that analysis of this consensus by subsequent historians has generally argued that due to the uncertainty surrounding some of the lessons of the war, European militaries tended to use them to confirm existing ideas rather than create new tactical concepts.<sup>196</sup> In the case of the British Army many of the lessons of the Russo-Japanese had already been learned from the Boer War. The idea of concealing field artillery and the need for close cooperation between infantry and artillery were ideas that the Royal Artillery had observed in South Africa.<sup>197</sup> In the case of the British military conferences of 1909 to 1914, there are more references to the Russo-Japanese War than the Boer War with regard to machine guns as the former was viewed as more relevant and modern. This would imply that the Boer War was an anti-climax when it came to the use of machine guns for the British Army and machine guns.<sup>198</sup>

One British military historian, J.F.C. Fuller, highlighted the fact that the number of machine guns per battalion was the same in 1914 as it had been before the Boer War, even though they had been used so effectively in the Russo-Japanese War.<sup>199</sup> How did

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<sup>193</sup> Ibid., p. 179.

<sup>194</sup> Ibid.

<sup>195</sup> Ibid.

<sup>196</sup> Ibid.

<sup>197</sup> Ibid.

<sup>198</sup> See military conferences papers from 1908-1914.

<sup>199</sup> Graham, 'The British Expeditionary Force in 1914 & the machine gun', p. 192. Fuller wrote, 'By 1918, fearful cost in life had compelled the number of automatic weapons to be increased from twenty four to over five hundred. Accepting this number as necessary, why was the 1914 equipment that same as 1899? The answer is, it had become tradition that the number of machine guns in a battalion should be two: just as in the fourteenth century it was tradition that no gentleman could fight save on horseback.'

this situation come about? Fuller wrote in 1923 when the memory of the First World War was still fresh in people's minds. To him, it was obvious that the lessons of the Russo-Japanese War had not been learned; yet those lessons were not as clear cut as he supposed. He spoke with the benefit of hindsight and was somewhat disingenuous to his predecessors. Dominick Graham refuted Fuller's arguments in an excellent article where he outlined the development of machine gun doctrine prior to the war.<sup>200</sup> It is Graham's contention that forces outside the control of the army held sway and that the army received as much resources as was available to procure new weapons. There were never enough resources to increase the number of machine guns per battalion but then again it was felt that there was no requirement to do so. The fact that British military authorities held the view that machine guns did not play a significant contribution to military victory was a generally held view within other armies as well.<sup>201</sup>

Sir James Edmonds, who wrote the official history of the Great War, laid the blame for the inadequacy of machine gun provision in 1914 at the door of the Treasury. He observed:

The rapid fire of the British infantry was introduced as a substitute for additional machine guns that were refused to it. In 1909 the School of Musketry urged that each battalion should have six guns instead of two: the suggestion was declined for financial reasons, and subsequent reductions in the Army Estimates and Vote made any such addition impossible. It was therefore decided to increase the rate of fire of each rifle by the special training of the men.<sup>202</sup>

However, Dominick Graham has challenged that view as being a simplistic view of events of the pre-war period. As the statement was published in the official history, it has acquired credence and has become a generally accepted view. Graham argued that the Treasury was not at fault for the lack of machine guns and indeed pointed out that Sir Richard Acland, an official in the Finance Branch of the War Office before 1914, had offered the Chief of the General Staff, Sir William Nicholson more machine guns but was rebuffed.<sup>203</sup> After the war, the officer class, of which Edmonds was part, blamed the politicians and civil servants for the state of the B.E.F. in 1914 with regard to its

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<sup>200</sup> Ibid. Fuller was a polemicist with the result that his writings have to be viewed in this context. Writing in 1982 Graham makes the point that up to that date, Fuller's explanation was accepted as fact but Graham debunks Fuller's statement and demonstrates that there is no substance to it.

<sup>201</sup> Ibid.

<sup>202</sup> Ibid.

<sup>203</sup> Ibid., p. 192.

equipment. However, that somewhat hid the full story. Civil servants do not know when war will break out and therefore cannot be expected to equip an army with the most up-to-date equipment. Furthermore, finance is finite and there are other funding requirements in a stable society. In the period between the Boer War and 1914 most of the resources available to the British armed forces were spent on the navy and what was available to the army was spent in the first instance on the artillery.<sup>204</sup> The latter was upgraded by the provision of the 18-pounder and the 4.5 inch howitzer. It was 1911 when it became the turn of the infantry and in that period they were re-equipped with a new machine gun, new ammunition and a modified rifle.<sup>205</sup> The new machine gun was the Vickers which was lighter than the Maxim then in service. The British army was relatively lucky in that they settled quite quickly on a machine gun, the Maxim and then the Vickers, unlike the Americans who wasted years trying to decide which gun to purchase.<sup>206</sup> Both guns had similar characteristics and were heavy machine guns. Tactical doctrine can only be settled upon once a weapon is selected. All the doctrine developed in the pre-war period was for heavy machine guns, there was no thought given to the use of automatic rifles or light machine guns. Once the war started and the problem of mobility of guns became an issue, the absence of light machine gun doctrine was to cause problems for troops on the ground.

The pre-war period also saw the first attempts at developing doctrine for the machine gun. One of the key champions of this new weapon was Major N. R. McMahon, the chief instructor at the School of Musketry, Hythe. He joined the school in June 1905.<sup>207</sup> McMahon is the officer credited with training British infantrymen to shoot an average of fifteen aimed shots per minute, the so-called 'mad minute'. He apparently developed this policy in response to the unavailability of sufficient machine guns. McMahon served in the Boer War and, based on his experience and experiments conducted at Hythe, came to the conclusion that the volume of fire was more important than its effect. In a trial conducted at Hythe, 100 first class marksmen were beaten by 150 second class marksmen in terms of the number of hits on target. The conclusion drawn from this test was that while fire at a higher rate was less accurate, it was more destructive

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<sup>204</sup> Bidwell & Graham, *Fire power*, p. 39.

<sup>205</sup> *Ibid.*

<sup>206</sup> Armstrong, *Bullets & bureaucrats*. Armstrong's book details the trials and tribulations of machine guns in the pre-war American army.

<sup>207</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 148.

and hence should be encouraged.<sup>208</sup> That conclusion was ideal for machine guns which could deliver this type of concentrated fire and as a result, McMahon called for the provision of six machine guns per battalion instead of two. However, this was rejected by the General Staff as unnecessary.<sup>209</sup>



Figure 5: Brigadier General N.R. McMahon, developer of the ‘mad minute’.  
Source: Longstaff & Atteridge, *The book of the machine gun*, p. 95.

As already emphasised the defensive capabilities of the machine gun were well understood but McMahon proposed that the offensive firepower of the infantry should be increased with the provision of automatic rifles or light machine guns. In order to neutralise the opposing machine guns, McMahon recommended the provision of light machine guns in the leading wave of the assault.<sup>210</sup> Tests conducted of automatic rifles at Hythe in 1908 gave rise to the conclusion that the volume of fire, rather than its accuracy, and the fire power of attacking troops rather than defensive machine guns were what the army needed.<sup>211</sup> McMahon was aware that individual soldiers in a firing line could not deliver the required firepower to suppress enemy defences without providing a tempting

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<sup>208</sup> Graham, ‘The British Expeditionary Force in 1914 & the machine gun’, p. 191.

<sup>209</sup> Ibid.

<sup>210</sup> Graham, ‘The British Expeditionary Force in 1914 & the machine gun’, p. 191.

<sup>211</sup> Ibid.



target for artillery. The standard requirement was that one rifleman per yard was needed to achieve fire superiority but that figure was unsafe because it would leave too tempting a target for artillery. Therefore, McMahon proposed to arm the advancing infantry with light machine guns. He required eight such weapons per battalion. These weapons would require simple fire tactics which could be easily taught to a conscript army.<sup>212</sup>

Apparently these findings were deemed controversial when presented to a General Staff annual conference in January 1910.<sup>213</sup> The view of the General Staff at that time was best expressed by Brigadier General Sir Lancelot Kiggell, who wrote in 1910 that,

Victory is won actually by the bayonet, or by the fear of it, which amounts to the same thing so far as the conduct of the attack is concerned. This fact was proved beyond doubt in the late [Russo-Japanese] war. I think the whole question rather hangs on that; and if we accept the view that victory is actually won by the bayonet, it settles the point.<sup>214</sup>

So the General Staff placed little emphasis on the idea of light machine guns. There were very few light machine guns in service; the Lewis machine gun only became operational with the Belgium army in 1913 and the American Army was equipped with the Benet-Mercié which never proved itself. When McMahon pointed out at a staff conference in 1910 that automatic rifles were then in service in the Mexican and Japanese armies.<sup>215</sup> He was looking for something yet available in any of the major armies but his vision was prophetic.

On 14 March 1911 Lieutenant Colonel J. Campbell, chief instructor at Hythe, delivered a lecture entitled 'Fire actions' to officers of the 1<sup>st</sup> and 2<sup>nd</sup> Divisions at Aldershot. (McMahon was in attendance.) Battles, Campbell declared, could only be won by advancing with the bayonet and not by 'playing long bowls with the enemy' with rifle fire.<sup>216</sup> A Captain Wetherell of the 1<sup>st</sup> Bedfordshire Regiment took exception to these remarks and made the following statement

They would never send men against fifty machine guns massed. There must come a time when it was madness to send human beings (however willing) to walk

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<sup>212</sup> Ibid.

<sup>213</sup> Ibid.

<sup>214</sup> Chief of the Imperial General Staff, *Report of a conference of General Staff officers at the Staff College, 17<sup>th</sup> to 29<sup>th</sup> January 1910* (London, 1910), p. 28.

<sup>215</sup> Graham, 'The British Expeditionary Force in 1914 & the machine gun', p. 192.

<sup>216</sup> Bidwell & Graham, *Fire power*, p. 31.

against metal pumped against them from rifles. The time had come for other methods. Manoeuvre, followed by digging in, together with intense rifle fire and artillery fire would win fights in the future. Fire had to be beaten down with fire.<sup>217</sup>

Dominick Graham contents that McMahon had enough influence with the General Staff to persuade them to modify the doctrine on the meaning of fire superiority.<sup>218</sup> The relevant section of *Infantry training* was amended so as to read, 'fire superiority makes the decision possible' instead of 'the decision obtained by fire.'<sup>219</sup> This change was an attempt to avoid infantry advancing slowly across the battlefield and trying to outshoot the defending enemy. The General Staff remained committed to the concept of infantry closing with the enemy quickly and defeating the latter at the point of the bayonet. This doctrine remained entrenched and indeed machine gun advocates realised this. R.V.K. Applin was still making references to bayonet attacks in 1917, but there would come about a change in how to get the infantry safely across the battlefield to the enemy trenches.<sup>220</sup> McMahon was trying to address the problem of movement around the battlefield. He realised that Britain would have to depend in the future on semi-trained volunteers who would not have the required rifle skills to obtain fire superiority. Therefore, the infantry should be equipped with light automatic weapons.

There were two conflicting ideas of infantry tactics being proposed at this time. The General Staff, as articulated by Brigadier General Sir Lancelot Kiggell, proposed assault tactics at the point of the bayonet, whereas McMahon proposed the development of fire superiority by infantry armed with light automatic weapons. The General Staff won out, not surprisingly in the end, and an increase in the amount of light machine guns was rejected. So McMahon's plea was rejected not on financial grounds but rather for tactical reasons. He therefore turned to increasing the rate of fire developed by the individual infantry to fifteen aimed shots per minute, which was far in excess of existing practice in European armies. He wrote 'there is only one alternative left to us. We must train every soldier in our army to become a human machine gun.'<sup>221</sup> He foresaw the use of machine guns and warned

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<sup>217</sup> Ibid. .

<sup>218</sup> Graham, 'The British Expeditionary Force in 1914 & the machine gun', p. 191

<sup>219</sup> Ibid. .

<sup>220</sup> Applin, 'Lecture on machine guns and their tactical employment' in *Machine gun notes, no. 2 (from British sources)*, p. 22.

<sup>221</sup> Samuels, *Command or control?*, p. 103.

Even if automatic rifles are not adopted, machine guns will be used in the near future in very large numbers. There need be no fear of overstating the value of these weapons. All tendencies in modern tactics, night firing, envelopment, avoidance of open ground, cramped fire frontage, cavalry fire action, invisibility and mobile reserves, bring their good qualities more and more into relief.<sup>222</sup>

He warned that other countries were developing these weapons and he believed that Britain should lead the way, stating that ‘no one abroad can teach us anything about it; we must solve the problem of automatic weapons and show the way to the rest of Europe’.<sup>223</sup> One interesting aspect of McMahon’s work was that in 1908, the German Military Attaché was given a draft of his proposals as part of a sharing of military information and apparently some of his theories got incorporated into the German Field Service Regulations of that year.<sup>224</sup>

One of the concepts mooted by McMahon was the notion of a light machine gun having a ‘voice’. The distinctive sound of a light machine gun starting up would be the signal to advance. Other commentators had similar ideas and Major General Henry Rawlinson, writing in 1910, describes the advantage of a machine gun:

The sustained rattle of a machine gun has an immense moral effect in proportion to the actual damage which it inflicts, and to make full use of this moral power it is desirable that it should come as a surprise when the success or failure of the combat hangs in the balance. Hence both in the attack and in defence it will probably be wise to reserve a proportion of the machine guns available, for use at close and decisive ranges where the terrain favours their being brought into action as a surprise.<sup>225</sup>

Rawlinson went on to say that when machine guns were massed in batteries, they lost their moral effect as ‘when the rapid fire of eight guns is at full blast the rattle of the guns is lost in the roar of the battery.’<sup>226</sup> Colonel Theodore Roosevelt expanded on this recounting how when at the Battle of San Juan Hill in Cuba in 1898, it was the sound of the American Gatling guns that gave his ‘Rough Riders’ the confidence to charge up the

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<sup>222</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 95.

<sup>223</sup> Graham, ‘The British Expeditionary Force in 1914 & the machine gun’, p. 191.

<sup>224</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 148.

<sup>225</sup> Jackson, *The organization of machine guns*, p. 3. The biographers of Rawlinson, Robin Prior and Trevor Wilson made the point that Rawlinson overrated the ability of morale to overcome the stopping power of entrenched defenders armed with modern weapons. Robin Prior and Trevor Wilson, *Command on the Western Front: the military career of Sir Henry Rawlinson, 1914-1918* (London, 1992), p. 10.

<sup>226</sup> *Ibid.*, p. 4.

hill at the Spanish trenches. He recalled that the hammering sound of the Gatling guns raised the spirits of his men.<sup>227</sup>

This concept might sound farfetched to the modern reader but boosting morale was a prime concern for military leaders. The cult of the offensive took shape in the period before the First World War. French military writers were to the forefront in advancing this idea among them the future Marshal of France, Ferdinand Foch and his pupil Colonel Louis de Grandmaison, director of the *Troisième Bureau*. Foch and Grandmaison favoured an offensive approach to warfare and both placed a lot of importance on élan and the will to advance at the point of the bayonet. Foch believed that a commander needed to inspire confidence and instil a positive attitude in his troops.<sup>228</sup> This idea of superior morale was very important and was preached widely within the European armies. Boosting of attacking morale was encouraged as it was thought that an embedded offensive spirit would somehow allow the troops to overcome any sort of obstacle. One French officer contended that ‘the offensive doubles the energy of the troops’ and ‘concentrates the thoughts of the commander on a single objective’.<sup>229</sup> Within the British military establishment it was declared that ‘modern [war] conditions have enormously increased the value of moral quality’ and ‘the moral attributes [are] the primary causes of all great success’<sup>230</sup> Officers like General Rawlinson thought that the noise of machine guns going off around them would imbue such enthusiasm that the infantry would immediately launch an attack and sweep to victory. The proof was seemingly there: the Americans had launched a successful attack against the Spanish in Cuba with the sound of machine guns going off in the background. Of course in reality the American attack was successful because the machine guns were also being used to suppress Spanish fire. However, anything that could be used to release the fervour within the advancing troops was to be welcomed. This noise creation was part of the cult of the offensive and the creation of a fighting spirit. It was embedded into the military psyches of the time and was very much part of the training. However, it was also creating an

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<sup>227</sup> Parker, *History of the Gatling gun detachment*, p.1; Jones, ‘Before the colors fade’, p. 26. Other writers reported on the use of the Gatlings. Trooper Jesse D. Langdon of the 1st Volunteer Infantry, who was part of the attack noted a similar inspiring result. Once hearing Parker’s Gatlings the American infantry stormed up the hill.

<sup>228</sup> Stephen Van Evera, ‘The cult of the offensive and the origins of the First World War’ in *International Security*, ix, no. 1 (Summer 1984), p. 60 (hereafter Van Evera, ‘The cult of the offensive’).

<sup>229</sup> Van Evera, ‘The cult of the offensive’ p. 61

<sup>230</sup> *Ibid.*

unrealistic role for machine guns, one that they could not perform. Part of the problem was how to get troops to advance across the battlefield under fire. There was a realisation that casualties would be incurred, but there was also a belief that if troops were instilled with the courage and knowledge that they were supported by machine guns, it would somehow inspire them to the supreme effort. In the 1890s a Polish banker, Jean de Bloch, published a six-volume work entitled *The war of the future*. It discussed the nature of future war and the effects of modern weapons. The last volume was translated into English in 1899 as *Is war now impossible?*<sup>231</sup> He concentrated on the fact that modern firepower had changed the future battlefield and expressed the belief that the modern European man would not be able to withstand modern war but he did concede that ‘the spirit of armies has a much greater importance than before’.<sup>232</sup> Bloch’s work was ignored but the question that it posed was how to empower mainly conscript troops to advance under modern fire. McMahon had the idea of machine guns advancing with the troops, while others spoke of them being empowered with pent up enthusiasm added to by the noise of machine guns going off around them. There were two conflicting theories. On the one hand, the doctrine of the offensive was preached with seemingly no thought given to casualties incurred, and on the other there were people like de Bloch who recognised that modern war would have high casualty rates. The question arises as to whether Brigadier General Sir Lancelot Kiggell and Major General Henry Rawlinson were in conflict with each other regarding machine guns. In 1910, Brigadier General Sir Lancelot Kiggell proposed assault tactics at the point of the bayonet, which would seem to disregard machine guns. Yet at the same time, Major General Rawlinson expressed support for machine guns. There was no conflict. Rawlinson was simply articulating the use of machine guns to raise morale to allow the troops to make the assault with the bayonet as outlined by Kiggell.

An incidence was recounted by Lieutenant Edward Spears of the 11<sup>th</sup> Hussars which demonstrated the distain of senior officers of the British Army towards machine guns and those who sought to further their use. While on manoeuvres with the 1<sup>st</sup> Cavalry Brigade, he was put in charge of all six Maxims of the brigade. He was instructed by his brigadier to ‘ride off and see if I could put them to some intelligent use.’<sup>233</sup> He found a

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<sup>231</sup> I.S., Bloch, *Is war now impossible* (London, 1899), (hereafter Bloch, *Is war now impossible*)

<sup>232</sup> Bloch, *Is war now impossible* p. 159.

<sup>233</sup> Goldsmith, *The devil’s paintbrush*, p. 122.

hill from which he could observe the whole brigade lined up about 1,000 yards away. He set up his guns and fired off blanks at the cavalry. He concluded that he wiped out the complete brigade several times over. He then reported to the Brigade commander, Brigadier General 'Black Jack' Kavanagh, that the entire brigade was destroyed.<sup>234</sup> Kavanagh's response was not what he expected. Spears was told that;

Never have I seen a lack of cavalry spirit more blatantly displayed. Turning to those about him he rasped out. Here is a young cavalry officer who has the impertinence to say that the infantry weapons he is so inappropriately certain about has wiped out the 1<sup>st</sup> Cavalry Brigade, the finest mounted force in Europe! Get off your horse, Sir, he barked at me, and hand it over and walk back to the barracks the proper form of locomotion for you!<sup>235</sup>

There are two ways of interpreting this episode, one either has the image of a senior general dismissing machine guns out of hand or alternatively Kavanagh may have been arguing that once under fire, the cavalry would have reacted and charged the machine guns, therefore demonstrating the 'cavalry spirit.' Referring to this episode Stephen Badsey asserts that the correct cavalry tactic was to charge the guns from several directions at once.<sup>236</sup>

During the pre-war period, there were certain officers who contributed to the debate about machine gun doctrine. One such officer was Lieutenant V.A. Jackson of the York and Lancaster Regiment. He published a book in 1910 entitled *The organization of machine guns and their tactical uses with notes on training*.<sup>237</sup> Described as a training guide it was to be used in conjunction with the Field Service Regulations, this publication was intended by Jackson to bring all the ideas about machine guns into one publication. It contained a preface by Major General Sir Henry Rawlinson who was very supportive of the book; he urged that it should be read by all infantry and artillery officers.<sup>238</sup> Another officer who was active in writing about machine guns during this period was Lieutenant J. Bostock of the King's Own Yorkshire Light Infantry. He published *The machine gunners' handbook, including the Vickers Light Gun* in 1913.<sup>239</sup> Bostock's book

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<sup>234</sup> Ibid.

<sup>235</sup> Ibid.

<sup>236</sup> Badsey, *Doctrine & reform in the British cavalry*, p. 207.

<sup>237</sup> Jackson, *The organization of machines guns*.

<sup>238</sup> Ibid.

<sup>239</sup> J., Bostock, *The machine gunners handbook including the Vickers light gun* (London, 1914).

remained in print throughout the entire war and went through several revisions and of course as already highlighted R.V.K. Applin was an authority on machine guns. However, both Bostock and Jackson were rewarded when in 1915 they were instructed to join a committee to compile an official publication on machine guns. The result of their deliberations was a pamphlet entitled *Machine gun training* published in November 1915.<sup>240</sup> At this early stage of the war, the army was finally utilising the experience of officers whose ideas they had previously dismissed. So there was a group of officers who were interested in machine guns and who were sufficiently concerned about the state of machine gun preparation in the British Army that they tried to push through their own ideas. This was quite normal activity and occurred in other branches of the army. Peace time armies by their nature have plenty of time to train and think, but also face restrictions in funding and expansion so in this era it was never possible to support all requests. This point sometimes is lost on junior ranks with the result that it becomes confused with inaction on the part of senior officers. Hindsight will always highlight missed opportunities and this is what happened with machine guns in the British Army during this period.

On the outbreak of the war, McMahon was promoted to Brigadier General and sent to France where he was killed on 11 November 1914.<sup>241</sup> His mantle of machine gun supremo was taken up by Major George Lindsay, who had served under him at the School of Musketry, Hythe. McMahon had actively supported some of Lindsay's ideas including a paper on tactics that he produced in 1913.<sup>242</sup>

Some officers had developed machine gun tactics and doctrine in the period prior to the war but at the time had been ignored. Parker in America had thought and written about most of the components that came to the fore, but his ideas were not relevant to the US Army and so were abandoned. Applin had written extensively about machine guns in the Russo-Japanese War and elsewhere but again his words of wisdom were not heeded. Elements of indirect overhead fire had been trialled by Applin in 1904 in Africa, and by Parker in Monterey in 1908 but nothing had come of these trials. Both Parker and Applin

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<sup>240</sup> Assembly of committee to compile 'Machine gun training' (B.T.M., Lindsay Papers B13). Jackson went on to reach the rank of major as a staff officer and was mentioned in despatches three times whereas Bostock served in the Machine Gun Corps for the duration of the war.

<sup>241</sup> Hutchinson, *Machines guns* p. 97.

<sup>242</sup> Lectures, details of courses etc., School of Musketry, Hythe & Eastern Command, 1913-14 (B.T.M., Lindsay Papers, A1(c)).

had discussed separate machine gun organisation during this period, but small peace time armies had no requirement for such structures. This pre-war period is hugely important because it demonstrates that the machine gun doctrine that would come to the fore during the war was already in place.

Although none of the combatants of the First World War were prepared for the war they would eventually fight, they thought they were. Pre-war ideas of modern warfare predicted that a European war would be short and fought within the military capabilities of the combatants. While some people thought that the war would be over by Christmas on declaration of war, British military authorities prepared for a war of several years duration.<sup>243</sup> In 1912 the General Staff had predicted that a general European war would last at least six months and if it lasted longer, then an economic blockade of Germany would be preferable to raising a mass army.<sup>244</sup> Some officers drew attention to the latent power of machine guns and other modern weapons but they all got ignored. Armies seemingly trained for the war that they wanted to fight and ignored what the enemy might do. So when the clash of arms happened, it took everybody by surprise and led to the stalemate of the trenches. As armies struggled to retrain and equip new forces, the development of new doctrine was side lined. Machine gun doctrine fell into this category but luckily the framework under which it could develop had already been laid out in the pre-war period.

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<sup>243</sup> Stuart Hallifax, 'Over by Christmas: British popular opinion and the short war of 1914' in *First World War Studies*, i, no. 2 (Oct. 2010), p. 104. When Kitchener made his call for volunteers in August 1914 he wanted troops to enlist for three years or the war's duration.

<sup>244</sup> Stephen Peter Rosen, *Winning the next war: innovation and the modern military* (New York, 1991), p. 114 (Rosen, *Winning the next war*).



## CHAPTER TWO: THEORY TO PRACTICE: GEORGE LINDSAY'S PIONEERING CONTRIBUTION TOWARD THE FOUNDATION OF THE MACHINE GUN CORPS

‘Saul has slain his thousands but David his tens of thousands’ George Lindsay.<sup>1</sup>

### LINDSAY'S ROLE IN THE ESTABLISHMENT OF THE MACHINE GUN CORPS

George M. Lindsay, having served in the Boer War as a lieutenant in the British Army in the Rifle Brigade, became interested in machine guns after his appointment to a training post in Malta in 1905. While there, he met R.V.K. Applin who was serving in a similar capacity and they exchanged ideas about the use of machine guns.<sup>2</sup> Lindsay subsequently served as an instructor in the School of Musketry, Hythe (1913-15) although he did not produce any written works on machine guns before the war he was a very active musketry instructor during his time at Hythe. In 1913, he was tasked with studying the German annual manoeuvres to ascertain if there were any benefits that could accrue to the Hythe training regime.<sup>3</sup> One striking thing that Lindsay noticed in the German reports was the absence of fire control. Therefore, the fire effect suffered. From this he thought that the lessons the British Army could learn were that ‘one of the most important parts of company training is to train the company to be able to produce the greatest possible fire effect.’ Under the heading of machine guns he wrote ‘I see nothing under this heading from which we can draw any lessons for use at the School of Musketry.’<sup>4</sup> He was very much a traditional instructor at Hythe since he believed in the development of firepower through musketry but recognised the place for cold steel in the final assault.

He produced a report entitled *Fire in battle* in 1914 and his opening statement incorporated a quote from Napoleon quote ‘in war, fire is everything’.<sup>5</sup> The purpose of

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<sup>1</sup> Biblical quotation used by George Lindsay in his opening lecture to the Machine Gun School at Grantham. The quote is also included on the back of the Machine Gun Corps Memorial at Hyde Park Corner in London.

<sup>2</sup> Applin, *Across the seven seas* p. 226.

<sup>3</sup> Lectures, details of courses etc., School of Musketry, Hythe & Eastern Command, 1913-14 (B.T.M., Lindsay Papers, A1(c)).

<sup>4</sup> Ibid.

<sup>5</sup> Lectures, details of courses etc., School of Musketry, Hythe & Eastern Command, 1913-14 (B.T.M., Lindsay Papers A1(v)).

the document was to articulate his views on musketry training and to reinforce his opinion that a high degree of musketry could not be maintained without a strict training regime. He developed this point stating that the infantry should be able to produce fire with the greatest volume and with the greatest effect. He was very particular about the development of fire and went as far as stating that only officers who understood the fire effect should be allowed to lead men in battle. Every training exercise should have at its core the production of sustained fire by well trained infantrymen.<sup>6</sup> The problem with this was the well trained infantry he referred to had become casualties in the opening battles of the war.<sup>7</sup> In order to produce the desired fire effect in advance the British Army would need to switch to the use of more machine guns.



Figure 6: George M. Lindsay pictured as Major General from a sketch by S. Morse-Brown, Tank Museum, Bovington in 1947.

Source: J.P. Harris, *Men, ideas and tanks: British military thought and armoured forces, 1903–1939* (London, 1995), p. 198.

On the outbreak of war, Lindsay was posted to Chatham to organise schools of instruction for the Special Reserve. With the aid of four staff sergeants from Hythe, he formed small schools at Chatham, Gravesend, Queensboro and Sheerness. The four

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<sup>6</sup> Lectures, details of courses etc., 1913-14 (B.T.M., Lindsay Papers A1(v)).

<sup>7</sup> War Office, *Statistics of the military effort of the British Empire during the Great War 1914-1920* (London, 1922). Between 22 August 1914 and 31 December 1914, 4,270 Officers, 91,384 others ranks were listed as killed, wounded or missing in action.

schools were merged into two at Chatham and Sheerness.<sup>8</sup> Lindsay was concerned that machine gun training was too disjointed and proposed a plan for the formation of a central training establishment to train instructors who in turn would carry out training in the New Armies. In October 1914 he submitted a proposal to the War Office which he described as a snowball scheme to train recruits in musketry.<sup>9</sup> This took the form of a pyramid scheme whereby one staff sergeant instructor at Hythe would train ten 1<sup>st</sup> class instructors each fortnight. They would then return to their units and train ten 2<sup>nd</sup> class instructors. These 2<sup>nd</sup> class instructors would then train ten recruits each. The cumulative effect of this was that Lindsay reckoned 500,000 recruits could be trained in musketry within five months.<sup>10</sup> He thought that the scheme could also be applied to the training of machine gunners. He proposed a further scheme that would provide 1,000 trained machine gunners within thirty-five weeks. Each seven-week course would train 100 officers and 100 N.C.O.s in machine gun musketry. These trained instructors would in turn train machine gunners in their home battalions and the cumulative effect would be 500 trained sections or 1,000 trained machine gunners.<sup>11</sup> The training would only consist of firing and the maintenance of guns and would leave no time for the training of machine gun tactics.<sup>12</sup> Machine gun tactics, fire control and fire discipline would be taught to more senior officers of the battalions of the new forces, then being formed. In the end, however, neither scheme went ahead as the School of Musketry was closed, and the instructors were dispersed to different camps around Britain to train the large numbers of additional soldiers, and oversee the increase in the size of the army.<sup>13</sup>

With the outbreak of the war and his experience in France, Lindsay's ideas turned to the use of machine guns in the development of fire, as he realised it would take too long for the infantry to develop the required musketry skills. Lindsay developed a new scheme for machine gun training of the New Armies in January 1915 which was rejected by the War Office.<sup>14</sup> However, this was refined and when he resubmitted it in February

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<sup>8</sup> Letter from George Lindsay to his brother, David, 7 March 1916 (B.T.M., Lindsay Papers, E2004.3078).

<sup>9</sup> Snowball Scheme complete, 1 Oct. 1914 (B.T.M., Lindsay Papers, A3).

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> Letter from George Lindsay to his brother, David, 7 March 1916 (B.T.M., Lindsay Papers, E2004.3078).

<sup>14</sup> Scheme for machine gun training of New armies, (rejected by W.O.), 25 January 1915 (B.T.M., Lindsay Papers, A10).

1915 it was accepted.<sup>15</sup> He considered the refined scheme to be far inferior to the original but recognised that it was better to have something accepted.



Figure 7: Staff of instructors at the School of Musketry, Hythe. Capt. G. Lindsay (Rifle Brigade), seated in the centre of middle row.

Source: Imperial War Museum (I.W.M.) (Q 53556).

A machine gun school had been established in late 1914 by Major C.D. Baker-Carr, who had previously served as an assistant instructor at the School of Musketry, at Caserne d'Abret, Saint Omer. Major General Sir Thomas Capper of the 7<sup>th</sup> Division authorised Baker-Carr to begin training new machine gunners.<sup>16</sup> Baker-Carr had served in the British Army during the Boer War, but at the outbreak of the First World War he was no longer on the Reserve of Officers. Eager to join up, he volunteered as a driver and spent the first couple of months acting as a chauffeur to senior officers using cars supplied

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<sup>15</sup> Scheme for machine gun training in divisions of New Armies, (accepted by W.O.), 2 February 1915 (B.T.M., Lindsay Papers, A12).

<sup>16</sup> Baker-Carr, *From chauffeur to brigadier*, p. 71.

by the Royal Automobile Association.<sup>17</sup> A chance meeting with Major General Sir Thomas Capper led his to being asked to train machine gunners and he quickly went about organising it. With the backing of Colonel G. M. Harper of the General Staff, he found a premises in Saint Omer and, with borrowed men and equipment, turned out his first gunners within fourteen days<sup>18</sup>. The initial cohort of troops were from the 28<sup>th</sup> Battalion, the London Regiment, who then went on to serve as instructors at the school and elsewhere.<sup>19</sup>



Figure 8: Officers practice using Vickers machine guns at the British Army School of Musketry at Hythe, Kent, on 21 Jan. 1915.

Source: Imperial War Museum (I.W.M.) 53550.

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<sup>17</sup> *Ibid.*, p. 24.

<sup>18</sup> *The Times*, 11 Jan. 1949.

<sup>19</sup> War Forces Records, <https://www.forces-war-records.co.uk/units/4375/21-artist-rifles/> (12 July 2017). The 28<sup>th</sup> Battalion, the London Regiment was known as the Artists' Rifles. It particularly attracted recruits from public schools and universities; on this basis, following the outbreak of the war, a number of enlisted members of the Artists Rifles were selected to be officers in other units. This exercise was so successful that, early in 1915, selected Artists officers and NCOs were transferred to run a separate Officers Training Corps.

Baker-Carr needed help in establishing the school at Saint Omer and knew George Lindsay from Hythe. He wrote to Lindsay offering him a post as instructor and asked him to bring some range finding books. Lindsay duly arrived in France in March 1915 to take up the post.<sup>20</sup>

Soon after, Lindsay and Baker-Carr circulated a questionnaire [dated 29 March 1915] to every machine gun officer in the B.E.F. Twenty-eight replies of variable sophistication were received and a report was compiled from the findings.<sup>21</sup> These questionnaires were then codified and published as *Notes on the employment of machine guns and the training of machine gunners* in July 1915.<sup>22</sup> The booklet testified the new emphasis being placed on experience learned since the outbreak of the war. This episode of the production of a new machine gun manual by Lindsay and Baker-Carr is an example of horizontal innovation as defined by Robert Foley. It follows a similar pattern that the German Army used on the Somme in 1916, whereby officers in the field turned experience into new tactics.<sup>23</sup> In terms of training, emphasis was placed on the correct placing of guns to have the required effect. One point of note was the concept of

Machine gun is the weapon of opportunity – but opportunities will not often come to those who are content to wait for them passively; they must be looked for. The good machine gun officer, by keeping himself in close touch with the situation, and handling his guns with boldness and cunning, will make opportunities for their successful employment.<sup>24</sup>

This publication of machine tactics is very similar to what V.A Jackson proposed in 1910.<sup>25</sup> The importance of surprise opening fire was also emphasised. Using machine guns in this manner was intended as an early tactic, as the full power of machine guns was not yet fully understood. The ‘weapon of opportunity’ tactic was a pre-war one which had been discontinued by the end of the war as a result of the growing realisation

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<sup>20</sup> Letters from Baker-Carr regarding joining G.H.Q School, Mar. 1915 (B.T.M., Lindsay Papers A13).

<sup>21</sup> Consolidated report on replies received in questionnaire sent out to every battalion in B.E. forces, Nov. 1915 (B.T.M., Lindsay Papers A29). Some of the replies came from experienced officers who would rise to prominence in machine gun circles in the future, including Captain G.S Hutchinson of Argyll and Sutherland Highlanders, Major R.C. Bingham of Machine Gun Guards.

<sup>22</sup> Consolidated report on replies received in questionnaire sent out to every battalion in B.E. forces, Nov. 1915 (B.T.M., Lindsay Papers A.29). Notes on the employment of machines guns and the training of machine gunners, 1915 (T.N.A., W.O. 33/718

<sup>23</sup> For a further analysis of Foley’s theory of horizontal innovation, see pages 333-8.

<sup>24</sup> Notes on the employment of machines guns and the training of machine gunners, 1915 (T.N.A., W.O. 33/718, p. 12).

<sup>25</sup> Jackson, *The organization of machines guns*, p. 9.

that machine guns would have a much better role. The fact that part V of the booklet referred to the actual use of machine guns in action at the Battle of Mons in August 1914, and at Neuve Chapelle in 1915 among others showed that the army was attempting to integrate the actual experience of machine guns with their book theory.<sup>26</sup> This is a clear example of doctrine evolving and changing.

In summer 1915 Lindsay was tasked with delivering a series of lectures on the tactical employment of machine guns in England.<sup>27</sup> While there he met an official of the Munitions Department who was responsible for the production of machine guns.<sup>28</sup> Based on information supplied by the official, Lindsay realised that by the spring of 1916 there would be more machine guns than trained machine gunners. He therefore redoubled his efforts to find a solution.<sup>29</sup> While initially he had some small successes with the War Office, he was frustrated that time was passing and no proper scheme was being put in place for the training of machine gunners. In June 1915 he submitted a proposal titled ‘Scheme for the formation of a Machine Gun Corps’ to the Commandant of the Machine Gun School General Head Quarters, Major C.D. Baker-Carr.<sup>30</sup> His reasoning was that the machine gun service had to be welded into a cohesive body. His paper stated that the Machine Gun Corps would be ‘a body trained on one system, actuated by one doctrine, and employed on one set of principles.’<sup>31</sup> This would never happen if the machine gun service was left to a series of independent companies, each working on its own ideas, with no bonds of sympathy and mutual interest between them.<sup>32</sup> Therefore, the Machine Gun Corps should consist of

- (a) Staff at the War Office.
- (b) Staff at the Head Quarters of the Army in the Field.
- (c) Staff at the Head Quarters of each Army.
- (d) Staff at the Head Quarters of each Corps.
- (e) 1 Machine gun regiment per division of the Army in the field.
- (f) 1 Machine Gun Training Centre in England.

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<sup>26</sup> Notes on the employment of machines guns and the training of machine gunners, 1915 (T.N.A., W.O. 33/718, p. 12).

<sup>27</sup> Letter from George Lindsay to his brother, David, 7 March 1916 (B.T.M., Lindsay Papers, E2004.3078).

<sup>28</sup> Letter from George Lindsay to his brother, David, 7 March 1916 (B.T.M., Lindsay Papers, E2004.3078).

<sup>29</sup> Ibid.

<sup>30</sup> Original draft of scheme for the formation of a Machine Gun Corps, June 1915 (B.T.M., Lindsay Papers E2004.1727).

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

(g) 1 Machine Gun School at General Head Quarters.<sup>33</sup>

The first task was the organisation of the Corps

- (a) The forming into companies of the Vickers and Maxim guns in each Brigade of the Army in the field.
- (b) The forming into machine gun ~~regiments~~ battalions of all the Companies so formed in each division.
- (c) The training and despatch from England of additional Machine Gun Companies to make up the Machine Gun Regiments with divisions to 4 companies where required.
- (d) The collecting of all Machine Gun Services into the Corps.<sup>34</sup>

Lindsay went on to state that the advantages of divisional machine gun regiments over brigade machine gun companies were better tactical training and handling, the development of mutual understanding and cooperation, and greater room for the divisional commander to employ the unit as he saw fit.<sup>35</sup> This is the earliest reference made by Lindsay to the establishment of the Machine Gun Corps. His previous schemes only dealt with the training of instructors and men. He was now recommending a totally new organisation, separate from the infantry. His reasoning was sound as other armed forces had developed similar type organisations. As part of the original proposal Lindsay looked to develop separate regiments/battalions of machine guns. However, while the Machine Gun Corps was sanctioned in principle separate machine battalions would not appear until the last year of the war.

Lindsay thought the first cohort of officers and N.C.O.s trained would be used to train the expanded classes of raw troops. He saw this as a development of his previous 'snowball scheme' but with more control. His timeline for establishing and producing machine gunners was very ambitious: he estimated that he could have 292 trained officers and N.C.O.s by September 1915, rising to a monthly output of 940 by February 1916.<sup>36</sup> Unfortunately, this was not attainable under the existing conditions and these numbers could not be produced for at least six months. He also realised that initially machine guns for training would be restricted but he remained confident that this would be overcome within months.

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<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

<sup>35</sup> Original draft of scheme for the formation of a Machine Gun Corps, June 1915 (B.T.M., Lindsay Papers E2004.1727).

<sup>36</sup> Ibid.



For Lindsay, one of the key components in the new organisation was the establishment of a Machine Gun School at G.H.Q. This School would have to be in France for the following reasons:

- (a) Keep in constant touch with Machine Gun Officers, and Staff, at the Front.
- (b) Collate and disseminate information on Machine Gun questions.
- (c) Train necessary Senior and other officers required to complete the divisional Machine Gun Regiments formed at the Front.
- (d) Keep in touch with the Training Centre in England by frequent visiting, exchange of information, and interchange of Staff Officers.
- (e) Hold Tactical Classes for Senior, Staff and Machine Gun Officers.
- (f) Assist in supplying drafts of trained Machine Gunners to replace Casualties.<sup>37</sup>

He finished the paper confidently predicting that 'the mere fact of all ranks belonging to one special Corps would tend to raise the General Standard of knowledge in a marked degree. Thus there would soon grow up a Corps of experts who would be able to use their guns to the fullest advantage under all possible circumstances.'<sup>38</sup> It is certain that this is the original proposal for a Machine Gun Corps developed in France by Lindsay. There is also no doubt that Lindsay worked closely with Baker-Carr and the proposal would have had Baker-Carr's name on it, as commandant of the School, when sent to the War Office.

Baker-Carr recounted how the proposal for a separate Machine Gun Corps emerged from his perspective. In his biography *From chauffeur to brigadier* he described how he submitted the joint proposal to the General Staff. He summed up the proposal as follows

Visualised a Corps, consisting of selected men, trained on the same principles, working on the same tactical lines, free from interference by well meaning, but misguided Battalion commanders. Each brigade was to have its machine gun company, under the general orders of the Brigadier, each division was to have its reserve machine gun company, making a total of four companies under the supervision of a Divisional Machine Gun Officer. Each corps and army was to have an officer to co-ordinate the activities and finally GHQ was to appoint an officer of the General Staff to supervise the whole.<sup>39</sup>

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<sup>37</sup> Ibid., p. 16.

<sup>38</sup> Original draft of scheme for the formation of a Machine Gun Corps, June 1915 (B.T.M., Lindsay Papers E2004.1727). p. 21.

<sup>39</sup> Baker-Carr, *From chauffeur to brigadier*, p. 105.

Nothing came of his proposal, but he also forwarded a copy privately to General Sir Archibald Murray, Deputy Chief of the Imperial General Staff whom he knew slightly. Baker-Carr recalled how, while at GHQ in France one morning, he was approached by a clerk who informed him that his file had been marked ‘no further interest’ and was to be sent to Le Havre for storage.<sup>40</sup> Retrieving the file, Baker-Carr resubmitted it. This time he was informed that the War Office would need to sanction it.<sup>41</sup> He attended a meeting about the establishment of the Machine Gun Corps chaired by the Chief of the Imperial General Staff, General Sir James Wolfe-Murray, on 26 September 1915.<sup>42</sup> However, whether Baker-Carr can in fact be credited with being the first to table a proposal to establish a M.G.C. is somewhat open to question since there is correspondence dated 5 July 1915, proposing the formation of a M.G.C. by the Director of Military Training, Heath-Caldwell.<sup>43</sup> Also Field Marshal Sir John French wrote from France on 23 July 1915 calling for the setting up of a M.G.C. to train new machine gunners.<sup>44</sup> Furthermore, there is no reference to Baker-Carr’s memo in the official record. Of course, that is not to say that he was not the first to have mooted the idea of a M.G.C. As he did not write any dates in his autobiography, it is difficult to dispute his claims which were never challenged when he published his memoirs in 1930. In his book *Collision of empires: Britain in three world wars, 1793-1945* Arnold Harvey outlines a similar sequence of events, but deviates from Baker-Carr’s narrative by claiming that ‘the true origin of the Machine Gun Corps was the memo by Major-General Frederick Heath Caldwell, Director of Military Training, dated 5 July 1915’. Harvey does, however, acknowledge that while Baker-Carr’s memo seems to have been ignored at G.H.Q., it might have informed some of the thinking behind the letter from Field Marshal French dated 23 July 1915.<sup>45</sup> Another hypothesis is that it may have been the private correspondence sent by Baker-Carr to General Sir Archibald Murray which in fact started the ball rolling. Baker-Carr was aggrieved that he did not get recognition for his idea at this time, but unbeknownst to him, his ideas had already gained traction.<sup>46</sup> Of course it was not entirely

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<sup>40</sup> Ibid., p. 114.

<sup>41</sup> Ibid., p. 133.

<sup>42</sup> Ibid., p. 139; Establishment of Machine Gun Training Centre at Grantham, 1915 (T.N.A., W.O. 32/5453). Baker-Carr’s attendance was noted in the official files.

<sup>43</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>44</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>45</sup> Harvey, *Collision of empires*, pp 372-4.

<sup>46</sup> Baker-Carr, *From chauffeur to brigadier*, p. 134.

Baker-Carr's idea in the first place but rather Lindsay's. Another figure who had also independently called for a separate arm of the service to be devoted to machine guns was Lieutenant V. A. Jackson in his book *The organization of machines guns and their tactical uses with notes on training* (1910).<sup>47</sup> Jackson wrote his book as a training aid for machine gunners but it is not possible to establish the extent of the readership. His call was ignored at the time but it may have influenced future thinking by more senior officers in a manner similar to Parker who proposed ideas and got nowhere in the short term.

This episode is an example of the inconsistencies that emerge when interpreting autobiographical accounts and clearly highlights the need for rigorous crosschecking and verification of facts, claims and judgements featured in the inherently subjective source material. Baker-Carr's claims in his autobiography do not quite tally with the archival material and this is something that crops up again when Baker-Carr makes comments about Haig in relation to machine guns.<sup>48</sup> Brutinel and Applin's testimony should also be viewed with a similar caveat and indeed have been treated with equal caution in the thesis.



Figure 9: Brigadier General C.D. Baker-Carr, one of the originators of the Machine Gun Corps, from a portrait by Oswald Birley.

Source: Baker-Carr, *From chauffeur to brigadier*.

According to the official records it was in a memo by Major-General Frederick Heath-Caldwell, Director of Military Training, dated 5 July 1915 who first mooted the idea of a

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<sup>47</sup> Jackson, *The organization of machines guns*, p. 9.

<sup>48</sup> For the further discussion about Haig and Baker-Carr see pages 344-8.

Machine Gun Corps. The matter had been apparently under consideration for a while at the War Office <sup>49</sup>. His concern was that the training of machine gunners was not being conducted in the most economical way.<sup>50</sup> At that time the system for training machine gunners was based on reserve battalions supplying machine gunners for front line battalions. Heath-Caldwell states that owing to the shortages of machine guns, this training could not easily be done by reserve battalions. His reasoning was as follows:

The disadvantage of our present system is that owing to the unevenness of casualties heavy demands are made on some battalions for machine gunners and scarcely any on others; thus in the first case a second demand often means a forced supply of half trained men or a partial meeting of the demand whereas in the second case we have instructors and trained men wasting their time.<sup>51</sup>

The solution was to pool all drafts of new recruits into a Machine Gun Corps from which trained gunners could then be allocated to battalions when the need arose. Conferences were held on 16, 18 and 25 August 1915 at which the idea of the Machine Gun Corps was formally established.<sup>52</sup> Present at the conferences were the Director of Staff Duties (DSD), Major General Whigham, Director of Military Training (DMT), Director of Organisation (DO), and representatives from SD2, MT2, AG1, AG2a, F1 and F2.<sup>53</sup> The principal recommendations to come out of the conference dated 25 August 1915 were as follows:

1. The Machine Gun Corps to consist of two branches, cavalry and infantry.
2. Officers if serving as regulars to be seconded for duty with the Corps, and if holding temporary commissions to be posted to the Corps.
3. Machine gun companies to consist of

	Officers	Gunners	Drivers	R.A.M.C.	Total
Infantry (32 guns)	13	191	34	2	240
Cavalry (24 guns)	10	180	100	2	292

4. The Machine Gun Corps to have a distinctive badge which should be decided on as soon as possible so as to act as an inducement to transfer and recruitment.

<sup>49</sup> See memo in Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>50</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>51</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

5. The new organisation to be on the basis of one machine gun company to each brigade of each division or cavalry division in the field, in addition to a machine gun section either attached to or joining part of each regiment and battalion
6. Personnel required - Taking eight guns per unit as the basis of a unit in a brigade, the number of guns and the personnel required for them would be:-

	<i>Trained as Machine Gunners</i>			<i>Current Establishment</i>	<i>Required to train new gunners</i>
	<i>Machine Gunners</i>	<i>Trained as Drivers</i>	<i>Total</i>	<i>ment</i>	<i>gunners</i>
<i>(a) For 123 companies for Infantry Brigades (41 divisions i.e. 11 Regular 30 New Armies)</i>	23,493	4,182	27,675	18,122	9,553
<i>(b) for 15 Squadrons for 15 Cavalry Brigades (5 Divisions)</i>	2,700	1,500	4,200	850	3,350
<i>Sub Total</i>	<u>26,193</u>	<u>5,682</u>	<u>31,875</u>	<u>18,972</u>	<u>12,903</u>
<i>(c) Territorials</i>					
<i>For 30 companies for Brigades (10 Divisions)</i>	5,730	1,020	6,750	4,080	2,670
<i>7th and 8th New Armies for 36 companies for Brigades (12 Divisions)</i>	6,876	1,224	8,100	2,592	5,508
<i>Sub Total</i>	<u>12,606</u>	<u>2,244</u>	<u>14,850</u>	<u>6,672</u>	<u>8,178</u>
<i>Grand Total</i>	<u>38,799</u>	<u>7,926</u>	<u>46,725</u>	<u>25,644</u>	<u>21,081</u>

10. The monthly wastage for machine gunners was estimated at 15% and 5% for drivers so the estimated monthly reinforcements required would be 1,031 machine gunners and 61 drivers.
11. ...If the machine gun personnel is trained as infantry in reserve units it is considered that it will take six weeks for each man to be trained as a machine gunner at a machine gun training centre.
12. In addition to the numbers required in the machine gun training centre there would also be 9,000 men in reserve units training for three months as cavalry or two months as infantry before being sent to the training centre as machine gunners.
13. It is proposed that the Machine Gun Training Centre should be located at Belton Park, Grantham, with a training establishment to be drawn up by the Director of Military Training.<sup>54</sup>

The recommendations from this conference were to prove highly significant in the formation of machine gun doctrine as they became the cornerstone for the establishment of the M.G.C., marking a crucial crossover from theory to institutional reality. The army order of 14 May 1915, 9/General No. /4976 (M.T.2) provided enough trained men to man four machine guns per battalion, but this number was now to be doubled. Some of the anticipated organisational problems that this new corps was to address included the

<sup>54</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).17A.

reduction in administrative work in relation to drafts, the avoidance of confusion in the records office, the reduction of the risk of men being lost sight of altogether in returns and the avoidance of the loss of the men's correspondence with their relatives, which was unpopular with men and officers.<sup>55</sup> It was recognised that having a pool of trained machine gunners was a much more efficient way of dealing with the huge demand created by the expansion of the army and the increased use of machine guns. In terms of training it was believed that better use would be made of machine guns by having a centralised training centre.<sup>56</sup> Certain guns could be set aside for instruction in mechanism and stripping while others could be used for firing. Developing a separate cap badge was seen as vital, as it would help to develop loyalty to the new organisation separate to the soldiers' allegiance to their original regiment.<sup>57</sup> As the organisation was being developed, the idea of extra pay for machine gunners as specialists was mooted by Heath-Caldwell, Director of Military Training, but this was rejected.<sup>58</sup> As can be seen from the titles of the representatives at this conference, this was an organisational meeting, because the M.G.C. was to be an administrative unit. The intention of the War Office was to streamline the training and organisation of the machine gun service and nothing more. However, Lindsay and Baker-Carr would push to develop the M.G.C. further. This establishment of the M.G.C. in 1915, can be seen in the concept of cultural model of innovation as advanced by Williamson Murray – an example of change and adoption being introduced in the very specific context (and within the associated and resource constraints).

As part of the discussions leading to the establishment of a separate corps, Major General Whigham stated that in the opinion of G.H.Q., it was a tactical necessity to develop machine gun companies for brigades, and that the proposed method would be to replace the four Vickers guns in battalions with four Lewis guns, and form the Vickers guns into companies of sixteen guns.<sup>59</sup> This option was seen as key in the tactical development of the machine gun. A machine gun company would be a self-contained unit with its own NCOs and officers, but would fight alongside the infantry. Field Marshal Sir John French had written from France to the War Office on the 23 July 1915 requesting a large number of trained machine gunners to man the additional machine guns of various

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<sup>55</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>56</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).18B.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

types which were being provided to the B.E.F. He concluded: 'In order to meet the above requirements, and with a view to ensuring uniformity of training, I would suggest the formation of a Corps of Machine Gunners, on similar lines to the Corps of Cyclists.'<sup>60</sup>

The King then issued the royal warrant establishing the Machine Gun Corps on 14 October 1915. It was signed on his behalf by Lord Kitchener.

#### Machine Gun Corps

George R.I.

Whereas We have approved of the formation of a Machine Gun Corps;  
Our Will and Pleasure is that the Machine Gun Corps shall be deemed to be a  
Corps for the purposes of the Army Act.

Given at our Court at St. James, this 14<sup>th</sup> day of October, in the 6<sup>th</sup> year of Our  
Reign

By His Majesty's Command  
KITCHENER.<sup>61</sup>

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<sup>60</sup> Formation of Machine Gun Corps, 1915 (T.N.A., W.O. 32/11239).

<sup>61</sup> Ibid.

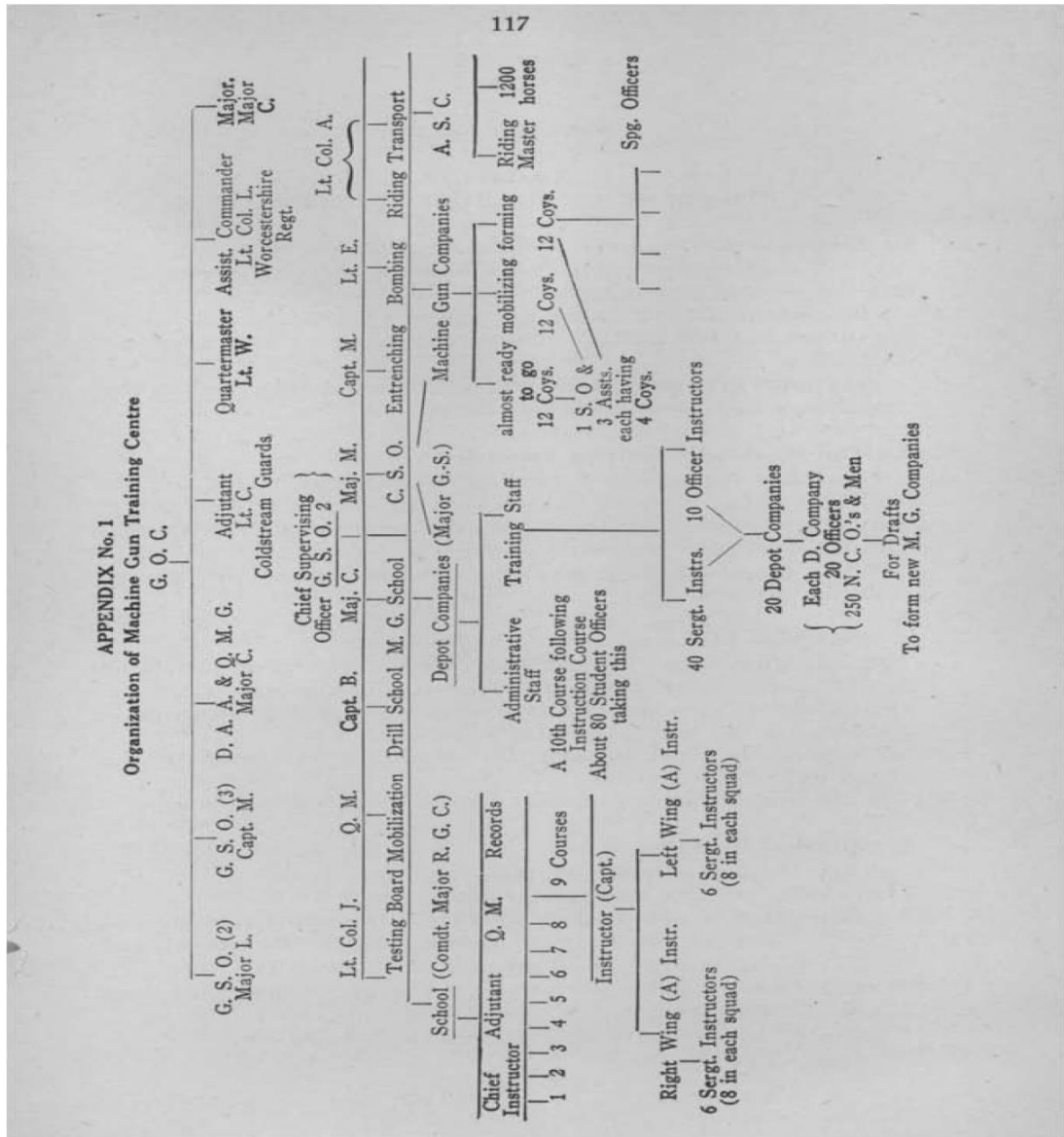


Figure 10: Organisational chart of the Machine Gun School.  
Source: War Department, *Machine gun notes no. 2 from British sources* (Washington, 1917), p. 117.

Baker-Carr in his autobiography claimed that the concept of a separate Machine Gun Corps was unique and revolutionary in arms.<sup>62</sup> Certainly, it was unique in the British Army and its establishment not without its critics, but it was not exclusive to Britain. In America, the home of the machine gun, a similar corps had been proposed in 1881 by

<sup>62</sup> Baker-Carr, *From chauffeur to brigadier*, p. 134.



Colonel Williston and then again by John Henry Parker in 1899.<sup>63</sup> The question arises as to whether Lindsay or Baker-Carr were aware of the American proposals. By this period Williston was certainly a forgotten historical figure, and still is, but Parker was still active and a prolific author. It is not impossible that either Lindsay or Baker-Carr were unaware of Parker's ideas as there is evidence to suggest that Parker's ideas were read in British military circles; yet no credit is given to his ideas. Baker-Carr in his autobiography was annoyed that he received no credit for the establishment of the Machine Gun Corps but it is striking that notwithstanding his acute sense of grievance at this unjust treatment, Baker-Carr yet had no difficulty in not giving any credit to Parker. He recalled how for

Six months or more, I had fought everybody at G.H.Q. to get my scheme through and, except from my own staff; I had never received one word of help or encouragement. I had been told that I was a visionary, a fanatic, a meddler with things that did not concern me, an insubordinate young pup. My scheme had been characterised as ridiculous, impossible, impracticable, subversive and contrary to all accepted military practice.<sup>64</sup>

Alternatively, this could be a case of an independent discovery such as can occur in military affairs from time to time since doctrine based around certain weapons systems evolves into similar forms, independent of each other and in different armies. In short such instances of independent innovation are commonplace features of military innovation.

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<sup>63</sup> Armstrong, *Bullets & bureaucrats*, p. 88; Major B. Williston called for the establishment of a separate machine gun corps for the U.S. Army in 1881. His idea was to create a separate Machine Gun Service headed by a brigadier general. A new machine gun school would be established to train National Guard units. The basic unit for machine guns would be a twelve-gun battery. This unit could either be sub divided into two six batteries or six two gun platoons. Each infantry and cavalry division would have a battery attached and each corps would have a reserve of two batteries available.

<sup>64</sup> Baker-Carr, *From chauffeur to brigadier*, p. 135.



Figure 11: Harrowby Camp, Grantham, Sports Day, 20 July 1917. General Hill.  
Source: Accession number: KO1769/01-140, King's Own Royal Regiment Museum,  
Lancaster <http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).<sup>65</sup>

The actual details of the establishment of the Machine Gun Corps are unclear. As has been emphasised, there is uncertainty about the originator of the proposal. However, the one figure who comes to the fore is Lindsay since he carried the idea through to the end of the war. In contrast to Baker-Carr who transferred his allegiance and energy to tanks, Lindsay remained part of the Machine Gun Corps.<sup>66</sup> He is the one officer that is still identified with machine guns from this period. The fact that his early submissions in June 1915 contain the final format of the M.G.C. leads to the conclusion that Lindsay was the architect of the force, something that he always claimed. It is rather unclear how his idea made its way to the War Office and whether it was slowed up by Baker-Carr, but the fact remains that his submission matches the final format. Lindsay claimed in a post-war document that from January 1915 he had been advocating a separate Machine Gun Corps.<sup>67</sup>

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<sup>65</sup> Brigadier General Hill commandant of Machine Gun Training Centre. Photograph from an album put together by Charles Leslie Roberts who was commissioned into the 7<sup>th</sup> Battalion King's Own in September 1914. Leslie Roberts was transferred to the Machine Gun Corps in February 1916.  
<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).

<sup>66</sup> Baker-Carr, *From chauffeur to brigadier*, For Baker-Carr's career in the Tank Corps see pages 162-266

<sup>67</sup> Correspondence and text regarding Lectures in England and the controversy about them, July 1915 (B.T.M., Lindsay Papers E2004.2743).

Lindsay was promoted to Major and appointed to the Machine Gun School in Grantham on 12 September 1915 as chief instructor.<sup>68</sup> This was a post that he had actively sought, as he felt he was the best qualified person for the job. During the war, he had developed a correspondence with Captain T.H. Phillips of the Coldstream Guards who worked at the War Office. In a letter dated 27 August 1915 Lindsay stated his desire to be appointed to the post and outlined his credentials. He claimed that it was his idea to develop the Machine Gun Corps, and he cursed the seniority rule in the army whereby promotion was based on long service rather than ability. He feared that other longer serving officers would be appointed above him. He also wanted to appoint his own instructors and had a list of suitable candidates available. He recommended a Colonel Gogarty whom he knew from Hythe as the Brigadier General in charge of the school and Baker-Carr for the post of commandant of the school<sup>69</sup>. Interestingly, he was not looking for these posts for himself. Lindsay has been accused of empire building with the establishment of the Machine Gun Corps; yet his correspondence bears no evidence of this.<sup>70</sup> He finished his letter to Phillips with an impassioned declaration that ‘this M.G. Corps is my “very blood” and I am mad that it shall be successful. And we must have knowledge, imagination, and energy to make it so.’<sup>71</sup> Throughout the war, Lindsay continued to reiterate this mantra in his correspondence with various officers and by mid-1917 it became believable. He was interested in machine guns because he believed in their power and thought that he could contribute to their efficient integration into mainstream use. However, to realise innovative ideas required resources, and sometimes ambition for the cause could be misconstrued as personal ambition. In addition, such inter-forces rivalry is commonplace in all military innovation further complicating the task of disentangling personalities from ideas and cultural organisational factors.

We get a revealing insight into the practicalities attendant on implementing an initiative within organisational structures, in a letter to Baker-Carr in November 1915 in which Lindsay described the first chaotic weeks at Grantham. There was a shortage of men for all forces including men for machine gun training. There was a time delay between the decision to establish the M.G.C. and the set up of the actual Machine Gun

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<sup>68</sup> Posting Major Lindsay from G.H.Q. to M.G.,T.C. as G.S.O.2. (B.T.M., Lindsay Papers A27).

<sup>69</sup> Letter to Phillips regarding the chief instructor’s job, 27 Aug. 1915 (B.T.M., Lindsay Papers B47).

<sup>70</sup> Griffith, *Battle tactics on the Western Front*, p. 120. Griffith makes the allegation that the establishment of the Machine Gun Corps was a case of empire building and institutional infighting with Lindsay at its centre.

<sup>71</sup> Letter to Phillips regarding chief instructor’s job, 27 Aug. 1915 (B.T.M., Lindsay Papers B47).

Training School. Senior officers at the War Office also delayed and at one stage Field Marshal Kitchener intervened with the decision to establish the machine gun school at Grantham and instead proposed it should go to Aldershot.<sup>72</sup> Kitchener annoyed some of his fellow generals. Lieutenant General Sir William Robertson, Chief of Staff of the B.E.F., raised concerns about Kitchener querying the establishment of the Machine Gun Corps in September 1915. Apparently, Kitchener was exercised about the number of personnel required to staff the new corps. According to Robertson, Kitchener thought that the corps would fight as a separate unit in France, whereas Robertson merely saw the new unit as a recruiting mechanism. He wanted new recruits trained as machine gunners as he believed they were more useful than ordinary infantrymen.<sup>73</sup>

Lindsay took this delay personally and was very concerned at the consequences. At one stage General Hill, the commanding officer at Grantham and Lindsay met with the C.I.G.S., General Sir Archibald Murray, to complain about the state of affairs. Murray expressed support for the situation but laid the blame at the door of the Adjutant General, stating and said that the delay was outside his control.<sup>74</sup> All of these delays convinced Lindsay that there was no strategic thinking on the value of machine guns. He discussed the circumstances with Colonel Swinton, who encouraged him to develop his thoughts in a paper which Swinton could then present to the ‘very highest’ in authority.<sup>75</sup> Lindsay was certain that the root of the problems with machine guns was ‘wrong thought’ and he was determined to address this obstacle. He was somewhat downbeat about the issue and what he saw as the failure to tackle the issues by certain authorities, admitting that ‘sometimes nearly lose heart and say “why kick against the pricks”’.<sup>76</sup> Throughout his correspondence, one is struck by the passion with which he wrote and the sheer conviction with which he pursues his ideas.

The first months of the Machine Gun Corps was taken up with the task of training the new recruits for front line service. Grantham was described as chaotic but it quickly

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<sup>72</sup> Letter to Baker-Carr from George Lindsay, Headquarters Machine Gun Corps, Grantham, 10 Nov. 1915 (B.T.M., Lindsay Papers E2004.1760), p. 2.

<sup>73</sup> Letter from Robertson to Lieutenant Colonel Oswald Arthur Gerald Fitzgerald, Personal Military Secretary to FM Horatio Herbert Kitchener, 24 Sept. 1915 (K.C.L., Liddell Hart Centre for Military Archives, Robertson Papers, 4/3/22).

<sup>74</sup> Letter to Baker-Carr from George Lindsay, Headquarters Machine Gun Corps, Grantham, 10 Nov. 1915 (B.T.M., Lindsay Papers E2004.1760), p. 3.

<sup>75</sup> *Ibid.*, p. 4. Colonel Swinton is best remembered as one of the developers of the tank and was one of the first commanding officers of tanks in battle.

<sup>76</sup> Letter to Baker-Carr from George Lindsay, Headquarters Machine Gun Corps, Grantham, 10 Nov. 1915 (B.T.M., Lindsay Papers E2004.1760), p. 7.

developed a rhythm and within six months was producing hundreds of machine gunners per month to replace 'wastage' from the front.<sup>77</sup> A major problem faced by the Machine Gun Training School was an absence of enough Vickers to train the troops and it was not until early 1916 that this was resolved. Early troops were trained in the use of both the Vickers and the Lewis light machine gun, but this was soon discontinued as it was felt that the Lewis was an infantry weapon and was rightly not part of the equipment of machine gun companies.

The establishment of the M.G.C. and the removal of the Vickers machine gun were not entirely welcomed by the front line troops who believed the Lewis was not an adequate replacement. However, over a period of time this issue was rectified. Major Wright of the Guards Machine Gun Regiment mentions the first occasion that the Guards Division went into the trenches and found no machine guns in the front line (near Neuve Chapelle in November 1915). The commanding officer protested strongly that he could not defend his front with Lewis guns alone and as a result, two Vickers were positioned in the front line trenches.<sup>78</sup> The number of Lewis guns per battalion was increased steadily throughout the war, from four initially, to sixteen before the battle of the Somme, until by November 1918, each infantry battalion had thirty-six guns.<sup>79</sup> Referring to the Lewis gun Paddy Griffith quotes the BEF official historian, Edmonds as follows:

The Lewis gun was little more than a cumbrous, heavy and not too reliable automatic rifle – in fact, the firepower of infantry battalions and brigades had just been lessened by the reorganisation of the machine gun companies into divisional battalions.<sup>80</sup>

Thus, by the Battle of the Somme in July 1916, sufficient numbers of machine gunners had been trained at Grantham and despatched to the frontline. Machine gun companies were formed and fought alongside their infantry counterparts. By mid-1916 each brigade had a machine gun company attached to it, armed with sixteen Vickers machine guns. There had been a proposal to create machine gun companies in late 1914 but this idea met with opposition from senior companies in the field.

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<sup>77</sup> Baker-Carr, *From chauffeur to brigadier*, p. 119.

<sup>78</sup> R.M. Wright, 'Machine gun tactics and organization' in *Army Quarterly* (1921), p. 294 (hereafter Wright, 'Machine gun tactics & organization').

<sup>79</sup> Griffith, *Battle tactics of the Western Front*, p. 130.

<sup>80</sup> *Ibid.*, p. 131.

General Haig and General Smith-Dorrien wrote to G.H.Q. to complain that machine guns should not be taken from forces in the field to form machine gun companies. Haig, in particular stressed that he was not in favour of the formation of brigade machine gun companies unless more than four machine guns per battalion became available.<sup>81</sup> It should be emphasised that both commanders were full of praise for the work of machine guns and simply wanted more direct support weapons.<sup>82</sup>

As the Machine Gun Corps was established, there was an urgent need for machine gunners in the field. Finally, the production of Vickers machine guns allowed for the first time an additional allocation to front line units. There was a proposal put forward in November 1915 by G.H.Q. that the additional machine guns would be allotted directly to the infantry battalions in the field.<sup>83</sup> Lindsay and Baker-Carr were totally opposed to this as it cut across the establishment of the Machine Gun Corps and they saw it as a regressive step. After the agreement that machine gun training would be centralised, here was a proposal that went against this. Lindsay and Baker-Carr therefore wrote to the War Office with their own scheme. The proposal that was put forward by Brigadier General Hill was to create a fourth machine gun company with the extra guns. This would allow a reserve to be available to the divisional commander and would be a much more efficient way of dealing with the extra guns.<sup>84</sup> Haig wrote to the War Office in March 1916 backing this request and a fourth machine gun company was duly formed.<sup>85</sup>

## STRATEGIC IDEAS AND POLITICAL MANOEUVERING

In a paper entitled '*The strategical [sic] and tactical value of machine guns*' dated [9 November 1915] and submitted to the War Office, Lindsay began with his mantra 'in war fire is everything'.<sup>86</sup> He went on to discuss how the value of troops could be

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<sup>81</sup> Opinions on proposed Brigade M.G. Coys., from 1<sup>st</sup> Army, 2<sup>nd</sup> Army, etc., 1915 (B.T.M., Lindsay Papers A16).

<sup>82</sup> Ibid.

<sup>83</sup> Letter from Major Baker-Carr, Commandant Machine Gun School and Letters to Major George Lindsay, 1 Dec. 1915 (B.T.M., Lindsay Papers E2004.1782.B.14).

<sup>84</sup> Ibid.

<sup>85</sup> Correspondence between Major Baker-Carr, George Lindsay and others, 3 Mar. 1916 (B.T.M., Lindsay Papers E2004.1823. B.43).

<sup>86</sup> Paper on the Strategical & Tactical value of M.Gs, 9 Nov. 1915 (B.T.M., Lindsay Papers B1).

enhanced by arming them with sufficient machine guns. The pre-war thinking was that a machine gun could produce the firepower of fifty troops, but with proper supervision and a sound tactical plan, machine guns could produce the defensive fire effect of 100 troops.<sup>87</sup> Therefore, a machine gun company of 150 men and sixteen machine guns could produce the fire effect of 1,600 men. With this in mind, Lindsay suggested that machine guns could be used to gain a strategic advantage.<sup>88</sup> Tactical weapons like machine guns should not have a strategic effect; rather, what is crucial is the combination of weapons and men into armies that act strategically.<sup>89</sup> The British Army was facing manpower shortages and did not have enough troops in the field to mount attacks. Based on this assumption, Lindsay proposed that it would be possible to reduce the number of troops defending the front line and replace them with machine gun defences. He reckoned that a force of two machine companies supported by 1,000 infantry could replace a brigade of 4,000 troops. This was a saving of 2,700 troops. He then expanded this scheme to an army size of eight divisions or 96,000 troops. By the end of his calculation, he estimated that a force of 62,400 troops could be released for other duties.<sup>90</sup> There would also be an increase in the mobility of smaller machine gun led forces and a reduction in the amount of supplies required by them. Lindsay urged that savings such as these should be 'worthy of very serious considerations and the saving in personnel thus effected would tend

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<sup>87</sup> Ibid.

<sup>88</sup> Ibid.

<sup>89</sup> David Lloyd George, *War memoirs of David Lloyd George, 1915-1916* (Boston, 1933), p. 73. Lloyd George wrote in his memoirs about the idea of using machine in a strategic manner and said 'This is what the Germans have done on the Western Front, to release men for the thrust against Russia, and what they are doing on their Eastern Front, to set free men for attacking Serbia, and for action on the Western Front. This power to replace men, which amounts to strategic elasticity, applied especially, I think, to our present intentions on the Western Front. Stephen Peter Rosen, *Winning the next war innovation and the modern military* (New York, 1991), pp 124-25. The idea of using a new weapon to reduce the number of men required for the battlefield was used by the advocates of tanks. This point was made by Brigadier H.J. Elles, commander of the Tank Corps, in 1918. Based on the results of the Battle of Cambrai where tanks preceded the infantry without an artillery barrage, hence saving on the number of artillerymen, he convinced Winston Churchill to commit to building 4,000 tanks for 1919. The Chief of the Imperial General Staff, Field Marshal Sir Henry Wilson, approved this plan based on Elle's arguments concerning the reduction in manpower. According to Stephen Peter Rosen, this is a typical measure of the strategic effectiveness of tanks in being able to demonstrate the reduction in scarce resources.

<sup>90</sup> Paper on the Strategic & Tactical value of M.Gs, 9 Nov. 1915 (B.T.M., Lindsay Papers B1). His paper stated: 'On the front B.... D are eight divisions; that is to say, 24 brigades, or 96,000 infantry. To replace each division withdrawal from these lines 8 machine gun companies and 3\* battalions will be required. Consequently, to hold B....D 64 machine gun companies and 24 battalions will be necessary. Since 24 battalions equal 2 divisions, 6 of the 8 divisions can be withdrawn from B.. D and placed on or behind A.. B. Thus 72,000 infantry are released for the offensive, and have been replaced by 9,600 machine gunners; in this manner a saving of 62,400 infantry has been effected on the front on which it is intended to remain on the defensive.'

towards a great reduction in the total casualties sustained by the armies in the field.<sup>91</sup> These sentiments are similar to those of Robert Gatling, who invented the Gatling gun with the idea of fighting wars with fewer troops and keeping the numbers of casualties from non-combat causes as low as possible.<sup>92</sup>

The response to Lindsay's paper was not what he expected. His Commanding Officer, Brigadier General Hill, wrote to him asking him not to write anything further as the Director of Military Training was annoyed by some of his comments.<sup>93</sup> Apparently the D.M.T. objected to Lindsay's idea of a machine gun battalion of four machine gun companies under the command of a senior officer. The Machine Gun Corps had been authorised based on the idea of machine gun companies being the largest unit in the field and here Lindsay was looking to develop bigger units, that is machine gun battalions. The D.M.T. was also objecting to concepts being put into the public domain without being agreed by the War Office.<sup>94</sup> Seemingly Lindsay's paper had found its way into the hands of some politicians, one of whom was Harold Tennant, the Under Secretary of War, who was using it to his own ends. Hill asked Lindsay to account for the copies he had produced. Lindsay replied and listed the people he had given copies to, namely Brigadier General Hill, Colonel Swinton, Major Baker-Carr, Major Phillips at the War Office and officers at the school. Lindsay was mortified by the incident and wrote to Hill seeking his aid in pacifying the D.M.T. and pointing out that he did not know any politicians especially Tennant. At the same time, he drew attention to the fact that he had mooted the idea of machine gun battalions in the original proposal for the establishment of the Machine Gun Corps.<sup>95</sup>

Within four days of Lindsay having written this scheme, the 12 November 1915, David Lloyd George, Minister of Munitions, presented a paper to Cabinet addressing precisely the same ideas as Lindsay on the strategic value of machine guns.<sup>96</sup> Lloyd George used the ratio of one machine gun being the equivalent to fifty riflemen to support his assertion that 'we could make up for our shortage of men and obtain equivalent

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<sup>91</sup> Paper on the Strategic & Tactical value of M.Gs, 9 Nov. 1915 (B.T.M., Lindsay Papers B1).

<sup>92</sup> Ellis, *The social history of the machine gun* pp 26-7.

<sup>93</sup> Letter from General Hill to Major Lindsay and his reply, 19 Nov. 1915 (B.T.M., Lindsay Papers E2004.1775.B6).

<sup>94</sup> *Ibid.*

<sup>95</sup> *Ibid.*

<sup>96</sup> Cabinet papers, 12 Nov. 1915 (T.N.A., Committee of Imperial Defence CAB/24/1).



fighting value by training 200 machine gunners instead of 1,000 riflemen. In other words, with 50,000 machine gunners we could do the work of 250,000 infantry'.<sup>97</sup> He continued:

It seems, also, that if our machine guns are employed on a large scale, on a comprehensive plan, they will, in conjunction with barbed wire and fortification, give us the strategic power, so far enjoyed by the Germans, of taking large numbers away from one front, where no offensive is in contemplation, and transferring them to a quarter where active operations are intended.<sup>98</sup>

The C.I.G.S. Lieutenant General A. J. Murray on 23 November 1915 replied to Lloyd George stating that the General Staff were not in agreement with the idea of large scale deployment of machine guns as the latter were valuable targets for enemy artillery and the loss of ten machine guns in a defensive positions would be the equivalent loss of 500 infantry.<sup>99</sup> He stated: 'in short, the introduction of the machine gun has not in the opinion of the General Staff, altered the universally accepted principle that superior numbers of bayonets closing with the enemy is what finally turns the scale and is the ultimate object of fire.'<sup>100</sup> Lloyd George was very much in favour of shifting the fight away from the Western Front. To him the use of mass machine guns on the Western Front allowed troops to be deployed in other theatres of war such as the Balkans. Lloyd George's scheme is remarkably like Lindsay's, therefore begging the question, was Lindsay in correspondence with Lloyd George? Although it would appear that the two were not in direct correspondence, Lindsay's ideas were clearly passed to Lloyd George through an acquaintance, J.C. Wedgwood.<sup>101</sup> When he wrote his strategic paper Lindsay was told that it would be passed to the 'very highest' in authority, so it is no surprise that it landed on the desk of Lloyd George. Lindsay did, however, deny to Hill that he passed it to any politicians but he must have known that it likely to end up on the desk of the Minister of Munitions.<sup>102</sup> What is clear is that Lindsay's idea laid the foundations for the defence in depth that the B.E.F. would attempt to implement in 1918 when they again faced

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<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

<sup>99</sup> Cabinet papers, 23 Nov. 1915 (T.N.A., Committee of Imperial Defence CAB/24/1).

<sup>100</sup> Ibid.

<sup>101</sup> Further letters from Commander Wedgwood, 18 Dec. 1915 (B.T.M., Lindsay Papers E2004.1801.B18).

<sup>102</sup> Letter from General Hill to Major Lindsay and his reply, 19 Nov. 1915 (B.T.M., Lindsay Papers E2004.1775.B6).

manpower shortages. But in 1915 there was still too much opposition to machine guns for this to happen.

Lindsay did court politicians who had military links in a bid to further the machine gun service. One such politician was the aforementioned J.C. Wedgwood who volunteered for military service at the start of the war and fought in Gallipoli. On return to England he met Lindsay who used Wedgwood's political links to lobby for resources for the machine gun service. Wedgwood introduced Lindsay to Duncan Millar, a Liberal M.P. for North East Lanarkshire.<sup>103</sup> Millar had sought to join the army and gain a commission in the M.G.C. but was deemed to be over age.<sup>104</sup> Millar visited Grantham and met Lindsay in early 1916.<sup>105</sup> Lindsay supplied him with information on machine gun use including his strategic paper. After his visit to Grantham, Millar made a speech in the House of Commons, where he urged the Under Secretary of War to provide sufficient resources for the newly formed M.G.C. and for the development of bigger machine gun units than companies.<sup>106</sup> One of the issues that had not been addressed to Lindsay's satisfaction was the formation of machine gun battalions. The largest unit formed to date was the machine gun company, and Lindsay saw Millar's speech as an opportunity to further this plan. Lindsay wanted to bring to the attention of the public the notion that machine guns had the potential to be 'savers, economisers and replacers of infantry and as the framework on which all defenders schemes are built, and from which all offensive efforts are launched.'<sup>107</sup> It was frowned upon for serving officers to be corresponding with politicians but Lindsay was quite happy to use his connections to further his aims. However, all of the letters between the two ended with assurances that they would keep the correspondence private and confidential.<sup>108</sup> Lindsay had gotten into trouble with the D.M.T. with suggestions circulating that he was passing information to politicians especially Tennant, and yet within a few months he was consorting with Millar who was having discussions with Tennant about machine guns. The role of civilian intervention in the process of military innovation as described by Barry Posen is evident in this episode.

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<sup>103</sup> Letter from Josiah Wedgwood and Major Lindsay's reply, 6 Dec. 1915 (B.T.M., Lindsay Papers E2004.1783.B6). He was 45 year old and Wedgwood thought he would make a good organiser in Grantham

<sup>104</sup> Ibid.

<sup>105</sup> Correspondence between Duncan Millar and George Lindsay, 16 Mar. 1916 (B.T.M., Lindsay Papers E2004.1783).

<sup>106</sup> Ibid.

<sup>107</sup> Letter from Josiah Wedgwood and Major Lindsay's reply, 24 Mar. 1916 (B.T.M., Lindsay Papers E2004.1783.B6).

<sup>108</sup> Ibid.

Lindsay and his interactions with Lloyd George and Duncan Millar fall into the category of a military maverick stepping outside the bounds of military authority and risking censure to get his point across.<sup>109</sup>

#### BATTLEFIELD EXPERIENCE AND LESSONS LEARNED

Lindsay was posted to France as the Brigade Major of the 99<sup>th</sup> Brigade, 2<sup>nd</sup> Division in June 1916.<sup>110</sup> He served for eleven months and was mentioned in dispatches for his efforts.<sup>111</sup> Some controversy surrounds his transfer to France and there was a suggestion that he had in fact been demoted from his post at Grantham. The Deputy Chief of the Imperial General Staff, General R. Whigham, visited Grantham in May 1916 and seemed unhappy with the inspection.<sup>112</sup> This led to a change in the structure of the school. It was decided that the Machine Gun Training Centre should come under the direct supervision of the War Office. This was against the advice of Field Marshal French and confounded others as the following comment made by an unnamed officer indicates: ‘I cannot for the life of me see why, if the Field Marshal is responsible for Royal Artillery, Cavalry, Infantry and every other sort of training, Machine Gun training alone should be under the War Office.’<sup>113</sup> In another change, Lindsay and Major McGillicuddy were posted to France. The same officer went on to say that a good word should be put in for Lindsay and McGillicuddy with their new commanding officer, Vesey. He wrote: ‘no one I think realises what these fellows did at the commencement of the Machine Gun Corps, and it is due to them and the early instructors that the training is as good, or as bad... as it is.’<sup>114</sup> This split of machine gun training at Grantham reporting to the War Office and machine gun training in France reporting to the G.H.Q. of the B.E.F. would have negative consequences in the future. It meant that machine gun doctrine would develop along different lines at each centre, and cause divisions and confusion. However, a visit by Field Marshal French went well for Lindsay and he received a complimentary note from his aide to congratulate him on his work. Major Phillips also wrote to him saying that French

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<sup>109</sup> Barry R. Posen, *The sources of military doctrine France, Britain, and Germany between the world wars* (New York, 1984), p. 225. This idea is further discussed on pages 348-51

<sup>110</sup>Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>111</sup> Ibid.

<sup>112</sup> Notes on conference in General Whigham’s room, 1916 (B.T.M., Lindsay Papers B60).

<sup>113</sup> Ibid.

<sup>114</sup> Ibid. It is unclear who the officer was but it could be Captain Phillips who was a supporter of Lindsay.

was very happy with the progress at Grantham and pointed out that a congratulatory letter from French was very unusual.<sup>115</sup>

While Brigade Major in the 99<sup>th</sup> Infantry Brigade, Lindsay was ideally placed to practise some of his theories, especially the different roles of the heavy Vickers and light Lewis machine guns. In an operation order dated July 1916, he wrote that machine guns should be pushed forward with the attacking infantry only when the enemy position was secured. He proposed that the Lewis guns should go forward before the Vickers to consolidate the infantry gains, but he was very careful with the heavy machine guns and was not willing to have them wasted unnecessarily.<sup>116</sup> In a trench raid in September 1916, he used his machine guns to provide covering fire for the infantry. The operation orders stated that the machine guns would fire continually from 8.30 p.m. to 2.55 a.m. to cover gaps in the enemy trenches. At times there would be a break in the fire when the raiders could advance. He thought this action was of sufficient interest to keep a copy of the operation order in his papers for future use.<sup>117</sup> An attack by the 99<sup>th</sup> Infantry Brigade on 23 October 1916 caused Lindsay to issue a comprehensive order with regard to machine guns. He was very keen that machine gun officers, while under the command of battalion commanders, should be allowed as much freedom as possible to carry out the instructions given to them. They should also keep in contact with the battalion commanders while attacking. The machine guns were ordered to go forward with the last wave of infantry to avoid being destroyed too early in the fighting.<sup>118</sup> This period in the trenches was to prove a valuable learning curve for Lindsay and was something that he thought all machine gun instructors should experience at some stage.<sup>119</sup> This time spent by Lindsay in the trenches allowed him to experiment with new ideas and could be seen as a component of horizontal innovation as envisaged by Robert Foley.

Lindsay's 99<sup>th</sup> Brigade fought during the later stages of the battle of the Somme. His experience was very similar to that of countless others. In terms of machine guns, the newly formed machine gun companies were trying to grapple with new doctrine. In attack, machine guns were to advance with the second line troops and help to hold the

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<sup>115</sup> Copy of a report on Lord French's inspection and letter from Major Phillips, 10 Apr. 1916 (B.T.M., Lindsay Papers E2004.1953 C.22 Apr. 1916).

<sup>116</sup> War diary, 99<sup>th</sup> Infantry Brigade, 7 July 1916 (T.N.A., W.O., 95/1368/3).

<sup>117</sup> *Ibid.*, 25/26 Sept. 1916 (T.N.A., W.O., 95/1368/3).

<sup>118</sup> War diary, 99<sup>th</sup> Infantry Brigade, 23 Oct. 1916 (T.N.A., W.O., 95/1368/3).

<sup>119</sup> G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E2004.2107 D19).

ground won from counter attacks.<sup>120</sup> This was the tactical plan for using machine guns at the time. The reality proved very different. It was found from bitter experience that Vickers machine guns were not easily portable over the destroyed battleground of the Somme, and moving them forward just after the attack left them open to destruction at the hands of the German artillery. This was the experience of Major Wright of the Guards Machine Gun Regiment at the Somme. He wrote:

The role assigned to the machine gunners was simply to consolidate the objective when reached and to resist the inevitable counter-attack. Little was said of the possibility of their assisting the attack by covering fire. Machine gun sections were allocated to each infantry wave; they were to advance by more or less definite routes and establish themselves at more or less definite points on the different objectives. There were no machine gun sections actually in the first waves, but they followed up in close support.<sup>121</sup>

Later on in the attack upon the Flers Ridge on 15 September 1916, the Guards adopted the same tactic of pushing forward their machine guns with the leading waves. Half of the guns of the company were destroyed and all the officers became casualties. Wright states that the casualties suffered by the Guards machine gunners were out of all proportion to the damage inflicted on the Germans.<sup>122</sup> He notes that the experiences of machine gunners in other divisions were similar to those of the Guards.<sup>123</sup> With the experience of mid-summer on the Somme, thoughts turned to improving the fire support at the point of attack by overhead indirect fire of machine guns. Indirect fire by massed machine guns was used to support the attacking troops and this was ably demonstrated in the attack on High Wood by the 100<sup>th</sup> Brigade, assisted by the 100<sup>th</sup> Machine Gun Company under the command of Major G.S. Hutchinson. Using ten Vickers machine guns, just 250 rounds short of one million rounds of ammunition were fired over a twelve-hour period in support of the attacking infantry. One gun is recorded as having fired 120,000 rounds continually without stoppages. The attack was successful, and captured prisoners afterwards reported that the ‘effect of the machine gun barrage was annihilating.’<sup>124</sup> This

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<sup>120</sup> Wright, ‘Machine gun tactics & organization’, p. 303

<sup>121</sup> Ibid.

<sup>122</sup> Wright, ‘Machine gun tactics & organization’

<sup>123</sup> Ibid., p. 304.

<sup>124</sup> Hutchinson, *Machines guns*, pp 185-87. This was one of the first attempts to use machine guns as an offensive weapon but it was only a small localised action by a company of machine guns and did not have an of the sophistication of future actions.

action by Hutchinson was a foretaste of future actions where machine guns would be used offensively and once developed properly would pay a significant role in victory. The war diary of the 100<sup>th</sup> Machine Gun Company for the 24 August 1916 records the attack commencing at 5.45pm and noting that by 8.00pm 67,000 rounds had being fired. The guns ceased firing at 6.10am on the morning of the 25 August at which stage a total of only 99,500 rounds are recorded as being used.<sup>125</sup> The war diary does note reports from prisoners the effectiveness of the barrage and also records a message of congratulations from the XV Corps commander on the successful operation.<sup>126</sup> This war diary entry contradicts the claim that was publicised by Hutchinson for years. The fact is that the attack was successful and was supported by a machine gun barrage but that not as much ammunition was used according to the official record as was previously stated.

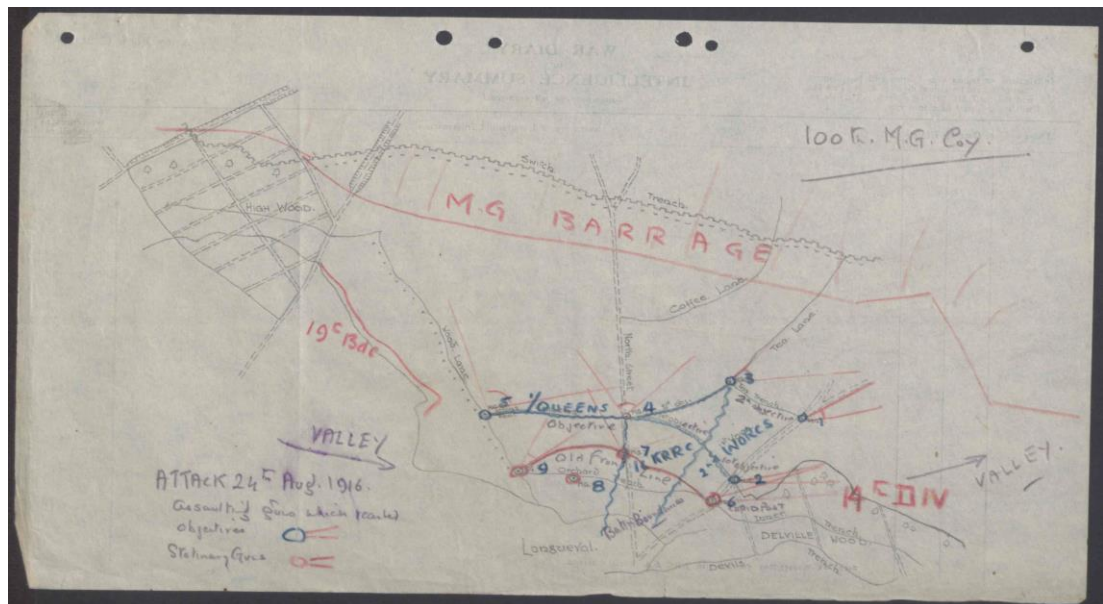


Figure 12 100<sup>th</sup> Machine Gun Company machine gun barrage map for the attack on High Wood 24 August 1916

Source: War diary, 100<sup>th</sup> Machine Gun Company, April 1916 – Jan. 1918 (T.N.A., W.O., 95/2431/3) p. 54.

After the Battle of the Somme and its huge losses in men and material, new ways were sought to break the deadlock of the trenches. One idea proposed was to use machine guns offensively. Indirect machine gun fire was ideal for this and it was the

<sup>125</sup> War diary, 100<sup>th</sup> Machine Gun Company, April 1916 – Jan. 1918 (T.N.A., W.O., 95/2431/3) p. 45.

<sup>126</sup> Ibid., p 48.

one tactic that the M.G.C. adopted as its own. Indirect machine gun fire at this stage of the war was used to aid the attacking infantry, but it was to develop further into barrage fire. In the static warfare of the Western Front, the trench system was mapped in great detail. These fixed lines allowed the idea of barrage fire to be developed. At a range of 2,000 yards the beaten zone of fire was seventy yards long by twenty feet wide.<sup>127</sup> This meant that the rounds would fall within a certain predetermined space. Based on accurate mapping and detailed calculations it was shown that massed machine guns were capable of covering an amount of ground with a deadly cone of fire. The idea of overhead fire took a while to be accepted by the infantry who were forced to advance with the noise of friendly bullets passing closely overhead. There was some initial concern about shots falling short but with practice this was not a problem.<sup>128</sup> In order to conduct indirect fire, the machine guns had to be moved back from the front line trenches, which the infantry viewed with suspicion<sup>129</sup>.



Figure 13: Hayling Island, watching a demonstration of indirect fire.  
Source: Accession Number: KO1769/01-79  
<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).

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<sup>127</sup> Hutchinson, *Machines guns*, p. 199.

<sup>128</sup> *Ibid.*

<sup>129</sup> *Ibid.*



Figure 14: Hayling Island, Machine Gun Course, 15 May 1915-29 May 1915 watching a demonstration of indirect fire.

Source: Accession number: KO1769/01-80

<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).



Figure 15: Hayling Island, Machine Gun Course, 15 May 1915- 29 May 1915 On the Range. Firing point.

Source: Accession number: KO1769/01-75

<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).





Figure 16: Hayling Island, Machine Gun Course, 15 May 1915-29 May 1915. On the Range with the commandant Captain Charteris.

Source: Accession number: KO1769/01-78

<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015)

After the battle of the Somme, battle experience of machine guns was codified and used in training manuals. The *Infantry machine gun company training manual* was issued in February 1917 for use in training machine gunners.<sup>130</sup> At this stage of the war the machine gun company was well established and the manual set out its organisation. ‘A machine gun company consists of: - headquarters commanded by a major or captain and sections, each of four guns, either Vickers or Maxims.’<sup>131</sup> The manual sets out how machine guns could be used in the attack, in defence and their use with an advance guard and with a rear guard. It has a section on the employment of Lewis guns which states ‘it must be clearly understood that the Lewis gun cannot take the place of the machine gun.’<sup>132</sup> The organisation and distribution of machine guns in a brigade were outlined as follows:

The introduction of the machine gun company organisation, while facilitating the collective employment of machine guns, does not mean that they should always be so employed. It may sometimes be advisable to detach machine guns under the

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<sup>130</sup> *Infantry Machine Gun Company training, 1917* (Naval and Military Press edition, Milton Keynes, 2009), (hereafter *Infantry Machine Gun Company training, 1917*).

<sup>131</sup> *Infantry Machine Gun Company training, 1917* p. 6.

<sup>132</sup> *Ibid.*

orders of battalion commanders and this should be done if the tactical situation requires it.<sup>133</sup>

It was the duty of the battalion commander to clearly understand why the guns were being attached to him and to issue definite instructions to the machine gun officer as to what was required of him. At the same time, the machine gun officer was allowed as much freedom as possible in the execution of his task.<sup>134</sup> In action, it was vital that the machine gun officer would keep in the closest possible touch with the brigade commander, and the section officers should keep in close touch with the commanders of the units to which they are attached and under whose command they came. Machine gun officers were to carefully follow this principle in order to avoid dual control and consequent misunderstanding.<sup>135</sup>



Figure 17: Men of the Machine Gun Corps in action with a Vickers machine gun (left) and captured German MG 08 machine gun, Moquet Farm, Sept. 1916.

Source: I.W.M. (Q 1420).

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<sup>133</sup> Ibid., p. 68.

<sup>134</sup> Ibid.

<sup>135</sup> Ibid.

When using machine guns in the attack, the infantry machine gun company training manual set out the steps that should be followed. The machine gun company commander should be thoroughly acquainted with the plan of operation and make a careful reconnaissance of the ground to be attacked.<sup>136</sup> This study of the ground should be made through the use of maps and visual aids such as telescopes. Based on his study of the ground and the objectives of the attack, the commander may decide to split his guns.<sup>137</sup> Some might go forward with the infantry and some might be held in reserve. The attacking guns should be placed under the command of the infantry commander and ought to fulfil the following roles:

- Assist the infantry in obtaining superiority of fire.
- Make good the positions won.
- Pursue the enemy with fire.
- Cover reorganisation of the infantry.
- Repel counter attacks.
- Cover retirement in the event of the attack proving unsuccessful.<sup>138</sup>

The guns going forward were only to move if the infantry was successful and should not advance with the first wave of the infantry as that is the job of the Lewis gunners. The role of other guns was to provide covering fire to the advancing infantry. They were to do so in the following ways: ‘By fire from the flanks, or through gaps in the line, by overhead fire or by indirect fire.’<sup>139</sup> The manual notes that ‘great care should be exercised in using indirect and overhead fire to avoid endangering our own troops.’<sup>140</sup> Battlefield experience was hugely important in the development of doctrine and there was a constant attempt to keep up to date by issuing ‘lessons learned’ updates to the frontline troops. This was a key task of the machine gun officers and the formalisation of that process of ongoing reflection on and interpretation of ‘lessons learned’ into the formation of machine gun companies during 1917 was a significant milestone in the development of machine gun doctrine as a whole.

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<sup>136</sup> *Infantry Machine Gun Company training, 1917*, p. 71.

<sup>137</sup> *Ibid.*

<sup>138</sup> *Infantry Machine Gun Company training, 1917*, p. 72.

<sup>139</sup> *Ibid.*

<sup>140</sup> *Ibid.*

## INFLUENCE OF BRUTINEL ON BRITISH DOCTRINE AND RELATIONS WITH LINDSAY

The relationship between Lindsay and the Canadian Raymond Brutinel was a key factor in the development of machine gun doctrine during the war. They worked together throughout the war to further the aims of the machine gun service. They were both passionate about machine guns and were convinced that the correct use of machine guns could make a very significant contribution towards winning the war and saving allied lives. They kept up a series of correspondence which detailed the evolution of their ideas. The correspondence could be edgy at times but at others complimentary, an example being when Lindsay wrote to congratulate Brutinel on his promotion to Brigadier General in May 1918.<sup>141</sup> They appear to have had a good relationship, were very keenly interested in each other's work, and recognised each other's expertise. The correspondence started in late 1915.

In a letter dated December 1915 Brutinel set out his thoughts on the development of the extra fourth company of machine guns per division.<sup>142</sup> Lindsay had proposed that any extra guns available would be formed into a fourth machine gun company and a machine gun battalion would be formed of the four machine gun companies. Brutinel agreed and thought that this would allow a career path to be developed in the M.G.C. There was concern that trained machine gun officers would leave the M.G.C. in order to be promoted, and their expertise would be lost to the machine gun service.<sup>143</sup> Brutinel, like Lindsay, understood the necessity to offer machine gun officers the chance to be promoted and progress within the M.G.C. This was an essential consideration in order to recruit the best officers. Brutinel lamented the problem of the regimental system of promotion that still existed within the British Army. This was not a problem in the Canadian Corps, but Brutinel recognised the constraints it imposed.<sup>144</sup> He informed Lindsay that he expected to be appointed to command a Canadian Machine Gun Corps when it was established. At that stage, Brutinel would seek Lindsay's advice on the

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<sup>141</sup> Congratulations to Brutinel on promotion, 23 March 1918 (B.T.M., Lindsay Papers D12).

<sup>142</sup> Letters from Brutinel in support of machine gun views, Jan. 1916 (B.T.M., Lindsay Papers E2004.1803. B22).

<sup>143</sup> Ibid.

<sup>144</sup> Ibid.

matter.<sup>145</sup> On 27 February 1916 Brutinel wrote to thank Lindsay for the hospitality accorded him when he visited Grantham, and enclosed a defensive scheme that he had developed with layered machine guns positions and barbed wire. Brutinel had such confidence in this defensive scheme that he wrote ‘the application of the principles enumerated above will render difficult, costly to the extreme, and sometimes impossible the progress of the enemy infantry beyond the front line system of trenches.’<sup>146</sup> The scheme involved overlapping lines and he positioned the machine guns in two lines. He explained that he had to go into a lot of detail in the scheme that he presented to the brigade commanders, who were concerned that they were losing machine guns from the front line. Once he was able to explain his rationale, the scheme was accepted. He thought that the scheme would be useful to Lindsay, who could incorporate it into some of his lectures.<sup>147</sup> Once the place names were removed from the scheme, Brutinel was pleased that it could be used in a training context.<sup>148</sup> From this point, we start to see the influence of Brutinel on British doctrine; he is the officer in the field acting as a development officer in the production of tactics and organisation. Significantly at this early stage in the war a Canadian officer was offering and expecting his advice to be accepted by the British Army. This was unheard of as the British senior officer class would have seen the Canadian Army as amateurs.<sup>149</sup> While there were other officers writing to Lindsay, none was more influential than Brutinel. At this time Brutinel was the leading authority on machine guns in the Canadian Corps.

In early 1916 they exchanged correspondence about machine gun organisation. Brutinel was designing a scheme for a Canadian Machine Gun Corps and wanted Lindsay’s input. Lindsay supplied him with a suggested template for a scaled down version of the M.G.C. which he thought would suit the Canadians.<sup>150</sup> He also sent

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<sup>145</sup> Ibid.; The Canadian Machine Gun Corps was not formed until April 1917.

<sup>146</sup> Letter from Brutinel with Canadian scheme of defence, 29 Feb. 1916 (B.T.M., Lindsay Papers E2004.1826. B39).

<sup>147</sup> Ibid.

<sup>148</sup> Ibid.

<sup>149</sup> Patrick H., Brennan, ‘Byng’s and Currie’s Commanders: a still untold story of the Canadian Corps’ in *Canadian Military History*, xi, no. 2 (Spring 2002), p. 5. A Canadian writer, Brennan observed how ‘In 1915, the Canadian Corps was little more than a rabble of enthusiastic amateurs, yet by 1917-18, it had become an accomplished professional fighting force.’ See also Alex D. Haynes, ‘The development of infantry doctrine in the Canadian Expeditionary Force, 1914-1918’ in *Canadian Military Journal* (Autumn 2007), p. 63. Another Canadian Haynes noted ‘In 1914, the embryonic elements of the CEF were poorly trained and equipped, and they were largely amateurish in their approach to war fighting.’

<sup>150</sup> Two letters from Brutinel and replies to same, 22 Mar. 1916 (B.T.M., Lindsay Papers E2004.1932.C5)

Brutinel a copy of his private paper on the *Strategical [sic] and tactical value of machine guns* and some other information. He stressed to Brutinel the importance of establishing a separate Canadian Machine Gun Corps and that force should encompass all the Canadian machine gunners with no exceptions.<sup>151</sup> He was probably aware that the Canadians Corps had some privately funded mobile units and consequently he was anxious that they should not remain outside any new arrangement.

In correspondence dated 2 September 1917, Brutinel wrote to Lindsay highlighting the fact that some particulars concerning the C.M.G.C. were being put about which Brutinel saw as incorrect.<sup>152</sup> He was referring to the development of massed machine guns for indirect fire in the offensive, in effect, barrage fire. In the letter, Brutinel pointed out what was at fault with British doctrine and its implementation in the field. He had come across a reference by Lindsay to the first use of barrage fire which Lindsay asserted was made by the Canadians at Vimy Ridge.<sup>153</sup> Brutinel was annoyed about this, and stated that the first use of barrage fire by the Canadians occurred on the 29 September 1915, when Brutinel himself commanded twenty machine guns.<sup>154</sup> This was before machine gun companies had been officially formed, and once that happened in early 1916, the Canadians used machine gun barrages in every subsequent attack. He stressed the point that the Canadians under his command worked hard to solve the problems of barrage fire and by September 1916 were able to use it as a viable tactic in the assault on Courrelette.<sup>155</sup> It was subsequently improved for attacks on Vimy Ridge and Hill 70.<sup>156</sup> Brutinel saw this slight as a disservice to the Canadian Corps and was determined to have it corrected. The other gripe that Brutinel had was the fact that he had supplied information on barrage fire to the machine gun schools at Camiers and Grantham and it was ignored. He stated

I supplied information referring this method to Camiers and also to Grantham – and that the information supplied was never acted upon and did not in any way allay the hostility, bred by proposed ignorance, short sightedness and

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<sup>151</sup> Ibid.

<sup>152</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37).

<sup>153</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37). The reference was apparently made by Lindsay to a group of French officers who visited Camiers during 1917.

<sup>154</sup> Ibid.

<sup>155</sup> Ibid.

<sup>156</sup> Ibid.

prevarication which characterised the attitude of the schools towards indirect fire and coordinated massed employment of machine guns, until March 1917 when under pressure originated by my Corps through official channels some steps were taken to generalise the new methods in the British Army.<sup>157</sup>

Brutinel went on to document the work he did when hosting eighteen Corps Machine Gun Officers at his headquarters after the Battle of Vimy Ridge.<sup>158</sup> Each officer stayed between one and five days and was supplied with full information about the barrage work at Vimy Ridge. This, he stated, had a greater effect on British tactics than anything else that had gone before. He was annoyed that it was only after the Battle of Vimy Ridge that Lindsay, to whom he refers disparagingly as the ‘M.G. High Priest’ along with the commanders of the General Staff finally took an interest in his work.<sup>159</sup> However, he backtracked somewhat and commended Lindsay for giving due recognition to him and the Canadian Corps in his lectures. Nonetheless, he continued with his main gripe, explaining

The reason why I am taking the point up is that there is something like an organised attempt made by a few individuals and very probably backed by Grantham (or rather a few people in Grantham) to ignore or avoid any reference to the work done in the Canadian Corps and claim the paternity of the new method of employment of M.G. in the offensive. I have been sent by [a] few honest people notes, or copies of notes which show conclusively that this is being done.<sup>160</sup>

Brutinel was concerned that staff at Grantham were themselves taking credit for devising barrage fire.<sup>161</sup> That annoyed him intensely given that for a long period they had ignored this tactic. He complained that for ‘over a year these sycophants did not only refuse to accept my work on organised indirect fire but they actually ridiculed and discouraged its teaching up to the point that Canadian officers and N.C.O.s begged not to be sent to courses.’<sup>162</sup> He was not impressed by Grantham and some of the officers there and suggested to Lindsay that they had made a mess of machine gun instruction to date in the

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<sup>157</sup> Letter from Brutinel on employment of M.G.’s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37).

<sup>158</sup> One of the officers was Lieutenant Colonel R.V.K. Applin of the II A.N.Z.A.C.

<sup>159</sup> Ibid.

<sup>160</sup> Letter from Brutinel on employment of M.G.’s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37).

<sup>161</sup> Ibid.

<sup>162</sup> Ibid.

war. Brutinel was aware of one incident for which Lindsay was apparently brought back from France to Grantham to sort out problems there.<sup>163</sup>

Correspondence between Brutinel and Captain C.R. Fay clearly show Brutinel's influence on British machine gun doctrine. He prepared a paper in early 1918 showing the relative numbers of machine guns per infantry for all the major protagonists of the war. When General Horne was shown the results he was so alarmed he went straight to General Wilson as Chief of the Imperial General Staff to address this shortfall. The result of all these deliberations was that the C.M.G.C. received an extra ninety machine guns and Brutinel predicted that the B.E.F. would follow suit.<sup>164</sup> Brutinel had interested Winston Churchill in this scheme to increase the number of machine guns per division but it was only sanctioned for the Canadian Corps.<sup>165</sup>

In correspondence after the war, Lindsay acknowledged the role of Brutinel in the development of the machine gun in the British Army. He described Brutinel 'as probably the greatest living authority on machine guns matters of all kind.'<sup>166</sup> He went on to state that 'I am convinced that it is greatly due to the foresight and knowledge of this latter officer that the tactical teaching on employment of machine guns in the British Army has reached the dated 25 November 1918 from Lindsay proposed 'that in the post-war organisation of the Machine Gun Corps, the adoption of the present Canadian organisation should be considered.'<sup>167</sup> This is the greatest compliment that could be paid to Brutinel, the idea that a dominion army structure could be adopted by the British Army.

Brutinel's expertise was called upon when he was required to give evidence to the 'Reorganisation Committee' convened in 1919 to review at the organisation of the post-war army. He recommended that ninety-six machine guns per division be organised in a machine gun battalion, the same structure that existed at the end of the war in the

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<sup>163</sup> Ibid.

<sup>164</sup> Correspondence between Brutinel, Fay, Ironside, Hewitt, 5 Apr. 1918 (B.T.M., Lindsay Papers E2004.2054.D1). Captain C. R. Fay was on the General Staff of the M.G.C.

<sup>165</sup> Brutinel seems to have formed a friendship with Churchill which seems to have endured after the war. Churchill in fact stayed with Brutinel in his home in the south of France in 1945 on his way to the Potsdam Conference.

<sup>166</sup> George Lindsay to General Deedes, 3 Mar. 1919, George Lindsay to Correspondence and text regarding Lectures in England and the controversy about them, 3 Mar. 1919 (B.T.M., Lindsay Papers E2004.2743).

<sup>167</sup> G.H.Q. Machine Gun conferences, 17 June 1918 (B.T.M., Lindsay Papers E2004.2107.D19).



Canadian Corps.<sup>168</sup> The ninety-six guns were to be organised into twelve units of eight guns each, grouped into three companies of four units each. As part of the force, he suggested that a special signal section be attached, especially in a war of movement as good communication was key to the success of the force. At this stage of their development, he saw tanks as an auxiliary weapon to the infantry which should not be included in the divisional structure but suggested that an anti-tank weapon was required. He also recommended that the machine gun battalion should be equipped with an anti-tank weapon.<sup>169</sup> Brutinel believed that by the end of the war, the machine gun battalion equipped with ninety-six machine guns was the ideal unit to achieve optimal efficiency and very simply saw no reason to change it.<sup>170</sup> This was his evidence to the committee. Another British officer, G. H. Darwell, praised Brutinel and his Canadians remarking that ‘it is curious the Canadians should show us the way in making a decent blunderbuss as regards M.G. defence organisation.’ This was in March 1916 when Brutinel was starting to make his mark.<sup>171</sup>

#### MACHINE GUN SCHOOLS AT GRANTHAM AND CAMIERS-COOPERATION AND CONFLICT

The correspondence between Brutinel and Lindsay draws attention to the relationship between the machine gun schools at Grantham and Camiers. Grantham was set up as the main school of the M.G.C. in late 1915.<sup>172</sup> Camiers was established in early 1915 when it was first established by Baker-Carr at St Omer and then moved to the Benedictine Convent at Wisques, four miles from St. Omer. It moved to Camiers in March 1916 as the G.H.Q. Small Arms School.<sup>173</sup> Major Baker-Carr picked the site which he described as ‘a priceless spot’ where there was a camp ready for 2,500 men beside the sea with two miles of sand dunes which were ideal for firing ranges.<sup>174</sup>

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<sup>168</sup> Summary of evidence to reorganisation committee, Feb. 1919 (B.T.M., Lindsay Papers E2004.2661.F5).

<sup>169</sup> Ibid.

<sup>170</sup> Ibid.

<sup>171</sup> Correspondence between Major Baker-Carr, George Lindsay and others, 3 Mar. 1916 (B.T.M., Lindsay Papers E2004.1823.B43).

<sup>172</sup> Establishment of Machine Gun Training Centre at Grantham, 1915 (T.N.A., W.O. 32/5453).

<sup>173</sup> Correspondence between Major Baker-Carr, George Lindsay and others, 3 Mar. 1916 (B.T.M., Lindsay Papers E2004.1823.B43).

<sup>174</sup> Ibid.

Lindsay was appointed chief instructor of the school on 25 May 1917. As Camiers was attached to the G.H.Q. of the British Army, it was close to the intellectual centre of the army. The commanding officer was General Cumming, but it was Lindsay as chief instructor who acted as the theorist. As it was close to the front, Camiers became the practical centre where new tactics were developed and honed. The staff at Grantham became somewhat side tracked and over a period of time, tensions started to rise between the two schools on matters of doctrine. It appears that the teaching staff at Grantham, or at least some of them, began to disagree about certain issues, the most important being barrage fire. As explained elsewhere in the thesis, it was Brutinel and the Canadian Corps who were at the forefront of this development. All of this political infighting can be seized upon by the opponents of an organisation and this is what happened with the M.G.C.

This issue came to a head in late 1917 when it was discussed in a series of correspondence between Lindsay, as chief instructor of Camiers, and the commandant of the M.G.T.C. Grantham, Colonel N. Charteris.<sup>175</sup> There were several points of contention at play. The G.H.Q. was anxious that new doctrine would be codified and published as training material and tactics. Instructions were issued so that the two schools would collaborate on a joint manual bringing together the best expertise of both. Writing a book collectively with different authors, each with their own opinion, is difficult at the best of time but to conduct it during the middle of a war was ambitious. The problem arose when nobody was appointed to oversee the entire project which resulted in something of an organisational crisis. Lindsay and his team at Camiers began work on the new S.S. in late 1917, operating in tandem with Grantham. The final version was ready for publication in January 1918.<sup>176</sup> Divided into two parts, the first dealt with tactical issues and the second focussed on organisation and direction of fire. There was major cooperation between the two schools with officers travelling back and forth to agree the text. There were some differences on the evaluation tables for use in indirect fire which was corrected, but Lindsay pointed out that the main problem was the rushed nature of the project. There was not enough time to get everything agreed due to the travel time between the schools

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<sup>175</sup> Correspondence concerning relations between Grantham and Camiers, 8 Nov. 1917 (B.T.M., Lindsay Papers E2004.1998. C40).

<sup>176</sup> *General Staff, The employment of machine guns, Jan., 1918, S.S. 192* (Naval and Military Press edition, Milton Keynes, 2008).

and Lindsay also pointed out 'if Grantham had carefully studied all the matter we sent them from time to time, they would know exactly what we are writing and teaching here.'<sup>177</sup> Lindsay claimed he went out of his way to maintain a close liaison between the two schools but he was hampered by

a clique of instructors in the Machine Gun School at the M.G.T.C., who I know are not well-disposed towards us, and are apparently known, because I happen to be in the position of being the person longest connected with the Machine Gun Corps of anyone and of being in close touch with so many people throughout the Corps, that my information as to what is going on, and being said and done throughout the Corps, is generally speedy and reliable.<sup>178</sup>

Lindsay mentioned that he spoke to Colonel Rennie and told him who he thought was responsible for causing the trouble; he wanted them removed.<sup>179</sup> Charteris replied that Grantham had differences in the angles of distribution of barrage work and this was causing confusion in the teaching material being used at Grantham. He also mentioned that he had redeployed a Major Cox from his office, whom some people at Camiers thought were not friendly towards Grantham, to a different course.<sup>180</sup> He also stated that the staff at Grantham were striving to keep up to date with the courses at Camiers but it was proving difficult as the doctrine was constantly changing.<sup>181</sup>

There were also constant complaints about the teaching at Grantham and some officers objected to attending courses there. One unnamed officer wrote:

I suppose Grantham will keep up its squabble with Camiers, and teach the only stuff it knows, through sheer ineptitude, as it always has. The only satisfactory part about it is, that whatever they teach has not the slightest influence on the work at the Front, where Grantham is just an unpleasant memory. What is there about the place that makes everyone out here hate it so? Can you tell me, by any chance?<sup>182</sup>

The contents of the letter led Charteris to describe the writer as a 'self opinionated ass' but he was concerned that this type of behaviour was undermining the work of the two

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<sup>177</sup> Correspondence concerning relations between Grantham and Camiers, 8 Nov. 1917 (B.T.M., Lindsay Papers E2004.1998. C40).

<sup>178</sup> Ibid.

<sup>179</sup> Ibid.

<sup>180</sup> Ibid.

<sup>181</sup> Ibid.

<sup>182</sup> Ibid.

schools and the machine gun service.<sup>183</sup> Lindsay investigated these allegations and interviewed the author of the letter. He satisfied himself that it was not the staff of the school at Camiers that had poisoned the minds against Grantham but rather the experience of returning officers to training courses. Lindsay conducted a survey among some D.M.G.O.s and found that when they returned to Grantham, they felt they were treated like either N.C.O.s or naughty children and their own battle experience was dismissed by officers who had never visited the front.<sup>184</sup> There was also the feeling that instructors in Grantham were avoiding the fighting and yet setting themselves up as experts. The result of this controversy was a quicker rotation in the instructors from Grantham to the front.<sup>185</sup> Lindsay made the valid point that Grantham should be restated as the centre, the home and the headquarters of the M.G.C. to stamp out this them and us syndrome. He was also critical of the system which in his eyes

denies to the Corps the right of a real individuality and existence in the true sense of the word, which refuses to provide it with proper headquarters in England and with the armies in the field, and which omits to supply the proper chain of responsibility from companies, through divisions, corps, armies and General Headquarters, to the Headquarters of the Corps which should be established as a Branch of the War Office.’<sup>186</sup>

This type of political infighting was not unusual in a new service but Lindsay was determined to stamp it out and keep the focus on developing new tactics. What he was also referring to was the fact that Grantham reported to the War Office and Camiers reported to G.H.Q.<sup>187</sup> This quite clearly disrupted the flow of ideas and restricted the ability of officers in the field to make recommendations to Grantham.

Captain Douglas Wimberley of the 51<sup>st</sup> (Highland) Division recalled issues arising between the machine gun schools at Grantham and Camiers and wrote ‘It was February 1917 before I actually got my company, I had quite a fright about it too. MGHQ [Machine Gun Headquarters] at GHQ France and the MGTC [Machine Gun Training Corps] Grantham did not get on over well, and the T. C. liked to give their

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<sup>183</sup> Ibid.

<sup>184</sup> Ibid.

<sup>185</sup> G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E2004.2107 D19).

<sup>186</sup> Correspondence concerning relations between Grantham and Camiers, 8 Nov. 1917 (B.T.M., Lindsay Papers E2004.1998. C40).

<sup>187</sup> Notes on conference in General Whigham’s room, 1916 (B.T.M., Lindsay Papers B60).

nominees the command of the new companies, rather than the fellows sent home from France for that purpose.<sup>188</sup>



Figure 18: Grantham, Harrowby Camp, 1-month refresher course under Captain Lyburn. Senior officers on a scheme.  
Source: <http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015).

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<sup>188</sup> Craig F. French, 'The 51<sup>st</sup> (Highland) Division during the First World War' (PhD thesis, University of Glasgow, 2006)p. 120.



Figure 19: Grantham, Harrowby Camp, 1-month refresher course under Captain Lyburn. Senior officers course, on a scheme.

Source: Accession number: KO1769/01-135

<http://www.kingsownmuseum.plus.com/gallerywwone016d.htm> (2 Apr. 2015)

#### ACTIVITY AT THE SMALL ARMS SCHOOL AT CAMIERS

The General Staff acknowledged the new work of the machine gun school at Camiers when it noted in an official publication in August 1917 that

as a means of developing to the full fighting value of the mass of machine guns with which the armies in France are now provided, the higher training of machine guns officers in the more advanced work which is now being undertaken at the Machine Gun Branch of the Small Arms School has an importance which cannot be strongly enough emphasised.<sup>189</sup>

Lindsay had moved from the 99<sup>th</sup> Brigade to Camiers in May 1917 to take up the post of Chief Instructor at the school with the rank of Lieutenant Colonel.<sup>190</sup> Both schools at Grantham and Camiers were heavily involved in the development of new doctrine. A

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<sup>189</sup> Goldsmith, *The grand old lady of no man's land*, p. 87. The school at Camiers was renamed G.H.Q. Small Arms School on 31 May 1917.

<sup>190</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

series of machine gun demonstrations took place on the sands at Camiers during the summer of 1917. These were attended by senior British officers and Allied officers. (This is explored in more detail in the chapter on Applin). The barrage demonstrations on the beach at Camiers was a key part of Lindsay's work during this period and these demonstrations were repeated during the summer. While a mass demonstration was useful to showcase the work of the school to the top brass, the real work was teaching the tactics to the mass of junior officers and men who passed through on the way to the front. Some officers who trained at Camiers came from Allied armies and found the experience beneficial.

Lindsay throughout his career maintained good working relations with the Allied armies. As part of his work in Camiers he was continually called upon to host foreign delegations who came to see the new tactics that he was developing. He hosted visits by French, American, Belgian and Italian officers at different times. In July 1917 nine French machine gun officers attended a special course at Camiers and afterwards freely admitted that the British tactics were far in advance of theirs.<sup>191</sup> The French machine gun manual *Instruction sur l'emploi tactique des mitrailleuses* was based on information supplied to these French officers.<sup>192</sup> Likewise, ten Belgian officers attended a four-week course in late 1917 at which Lindsay was presented with the Belgian Croix de Guerre and made an honorary officer of the Order of Leopard.<sup>193</sup> Eight Italian officers attended a course and were very impressed with the standard of teaching.<sup>194</sup> On arrival in France, the A.E.F. adopted SS192 and Lindsay was called upon to lecture at the American General Staff College.<sup>195</sup>

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<sup>191</sup> Bundles of letter from foreign officers to whom I sent SS.192. (B.T.M., Lindsay Papers. E.2004.2007.C.45).

<sup>192</sup> Correspondence and text regarding lectures in England and the controversy about them, Mar. 1919 (B.T.M., Lindsay Papers E2004.2743).

<sup>193</sup> Ibid.

<sup>194</sup> Ibid,

<sup>195</sup> Ibid.



Figure 20 Corporal of the Machine Gun Corps traversing German communication trenches at night at Cambrai, 14 Jan. 1918.

Source: Imperial War Museum (Q 6969)

Lindsay received a lot of praise from officers in the field including officers from the French and Belgium armies who wrote to thank him for putting together SS192. Among these was Lieutenant Ricoux C.I.E.A. Saint Cyr, who was especially interested in the methods of indirect fire employed by ‘our allies, the English’. He wrote: ‘I went yesterday on a study trip to the front where I saw the English regulations in the hands of Lieutenant Beurieux. He asks if Lindsay can send him the regulations.’<sup>196</sup> Another correspondent Jean le Bobinner, thanked Lindsay for sending him regulations and mentions that the tactical regulations had already been translated into French.<sup>197</sup> A Captain Boffy wrote in August 1917: he had visited Lindsay’s school. In reply Lindsay sent Boffy a copy of SS192 and stated that he looked back with great pleasure to the time that Boffy and his colleagues of the Machine Gun Service of the French Army spent with him at Camiers.<sup>198</sup> He also mentioned that he had received letters both from them and from many other machine gun officers of the French Army since that time. Lindsay

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<sup>196</sup> Bundles of letters from foreign officers to whom I sent SS. 192, various dates (B.T.M., Lindsay Papers C45). There are over twenty-five letters from different French officers.

<sup>197</sup> Ibid.

<sup>198</sup> Ibid.



expressed his satisfaction at the strong bonds of sympathy that had developed between the Machine Gun Services of both Armies.<sup>199</sup>

The experiments in barrage fire at Camiers were codified in the manual *Infantry machine gun company training*.<sup>200</sup> Because of the flat trajectory of the bullet, overhead fire can only be used at longer ranges (over 1,000 yards) to ensure safety to friendly troops. At even longer ranges the safety element is extended as the gun can fire at a higher angle. The problem at extreme distances is observing the fall of shot, but this can be estimated by mathematical means.<sup>201</sup> According to the manual indirect overhead fire could be safely employed when ‘the positions of our own and the enemy’s units are clearly marked.’<sup>202</sup> The best results are achieved when the strike of the bullets can be observed, but if this is not possible the most that can be done is to sweep an area of ground, in which the target is included.<sup>203</sup> Fire should be directed onto the hostile support or reserve lines, communication trenches, cooking places, ration parties, reverse slopes of hills. Searching reverse slopes is a useful tactic to deal with enemy troops sheltering from observation, but it requires detailed calculations and preparation to achieve it and the manual sets out the steps to be followed.<sup>204</sup> Following on from the infantry machine gun company training manual a pamphlet entitled *notes and rules for barrage fire with machine guns* was printed by the Machine Gun Training Centre at Grantham in May 1917.<sup>205</sup> It attempted to instil knowledge about this new tactic.<sup>206</sup> With this new manual it was finally accepted that barrage fire would play a major role in future attacks. For now onwards machine guns would have an official dual use as offensive as well as defensive weapon.

By the end of 1917 Lindsay had helped establish the M.G.C. in 1915, acted as the senior instructor in the Machine Gun School in Grantham, been a Brigade Major of the 99<sup>th</sup> Brigade during the battle of the Somme in 1916 and was then in May 1917 posted to the Small Arms School at Camiers. This work was very much appreciated and indeed

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<sup>199</sup> Ibid.

<sup>200</sup> *Infantry Machine Gun Company training, 1917*

<sup>201</sup> Ibid., p. 43.

<sup>202</sup> Ibid., p. 58.

<sup>203</sup> Ibid.

<sup>204</sup> Ibid., pp. 63-64.

<sup>205</sup> *Notes and rules for barrage fire with machine guns, May 1917.*

<sup>206</sup> Ibid.

Field Marshal Haig made the following comments about machine guns in general when he stated

During the past year the use of the machine gun in offensive warfare has been considerably extended. The machine gun barrage has taken a definite place with the artillery barrage in covering the advance of our infantry, while the lighter forms of machine guns have proved of great assistance in the capture of hostile strong points. In these directions, as well as in the repulse of hostile counter-attacks, great boldness and skill have been shown, and very valuable work has been done by all ranks of the Machine Gun Corps.<sup>207</sup>

The fighting in 1918 was to be different from the previous four years of conflict. The Germans would launch a series of major offensives which would put huge strain on the Allies and then from the summer onwards the Allies would strike back and finally secure victory in November 1918. The M.G.C. would play a key role in these defensive battles in the spring and then would quite quickly go on the offensive. Lindsay would help shape these new defensive and offensive doctrine as he finally got promoted to a post which allowed him the latitude to make a significant contribution.

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<sup>207</sup> J.H. Boraston (ed.), Sir Douglas Haig; despatch of 25 December 1917 (London, 1919), p. 140.

## CHAPTER THREE: LINDSAY AND THE DEVELOPMENT OF DOCTRINE – THE BEST DIMGU IN THE ARMY?

Then up spoke Colonel Georgius, the M.G.'s pride and joy,  
(He was a most unruly lad the Corpse's eldest boy)  
I tell you straight, said he, that's not the way to win the war,  
You want a lot more guns and men, you want a M.G. Corps.  
You must fight your guns in batteries from a grand divisional Pool  
Give them fifty bob protractors too; made at the Small Arms School  
With these and other blessings of a centralised control  
We'll drive the hun across the Rhine and leave him up the Pole – Machine Gun Corps song<sup>1</sup>

### PUBLICATION OF DOCTRINE AND THE STORY OF SS192

Machine gun doctrine reached its highpoint in January 1918 with the publication of SS192 *The employment of machine guns: part I tactical, part II organisation and direction of fire.*<sup>2</sup> It was written predominantly by Lindsay and his staff at Camiers.<sup>3</sup> It consisted of two parts, the first focussed on tactics, the other on organisation and direction of fire. Since this booklet replaced all previous publications it became known as the machine gunner's bible. Its statement that 'next to the artillery, the machine gun is the most effective weapon in modern war'<sup>4</sup> represented a major advance from the start of the war, when the machine gun was considered just a weapon of opportunity. For the first time this manual asserted that the machine gun was an effective offensive weapon. This had come about through better training and the development of new technical equipment. The manual stated 'in every operation machine guns must be organised, and their fire directed, with a view to developing to the full their offensive power; and in all training the offensive spirit in machine gunnery must be inculcated.'<sup>5</sup> It also defined barrage fire for the first time as 'the fire of a large number of guns acting under a centralised control,

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<sup>1</sup> Machine Gun Corps song (B.T.M., Lindsay Papers E2004.1960)

<sup>2</sup> *General Staff, The employment of machine guns, Jan., 1918, S.S. 192* (Naval and Military Press edition, Milton Keynes, 2008).

<sup>3</sup> Correspondence and text regarding lectures in England and the controversy about them, 3 Mar. 1919 (B.T.M., Lindsay Papers E2004.2743). He gives credit to Colonel C.C. Hewitt and Captain C.R. Fay as his co-authors.

<sup>4</sup> *The employment of machine guns, Jan. 1918*, p. 5.

<sup>5</sup> *Ibid.*, p. 6.

directed on to definite lines of areas, in which the frontage engaged by a gun approximates forty yards.<sup>6</sup> Tactical innovation with machine guns had advanced to such an extent that its uses had expanded and were for the first time documented. One of the new ideas proposed in this manual was that a machine gun could hold ground and serve as an ‘economiser of men.’ The machine guns could also defend front line trenches, and therefore release the infantry for offensive operations elsewhere on the front.<sup>7</sup> Outlining the principles of the attack, it was noted that the best use of machine guns is in the offensive phase of the battle and their most efficient use is helping the infantry with a combination of direct and indirect fire. It was noted that while machine guns fight with the infantry, they do not necessarily fight from the same positions.<sup>8</sup>

It was envisaged that the machine guns of a division would be divided into forward guns and rear guns. The former were defined as ‘the guns allocated to infantry brigades to go forward in support of the attacking battalions, and carry out consolidation in depth of the ground won, these guns are definitely under the control of the brigade commander.’<sup>9</sup> Rear guns were ‘the guns which supply barrage and other forms of covering fire from positions in rear.’<sup>10</sup> Forward guns were not to attack with the infantry as that was the function of the Lewis guns, but they were to move forward in ‘bounds’ along previously selected routes. When the Front was stabilised, ‘batteries of opportunity’ consisting of not more than four guns were to move forward to reach points from which good forward observation can be obtained. Their function was to give close support to the infantry using direct fire, supplement and stiffen the system of defence of the newly captured area, to engage hostile artillery or infantry and to engage hostile planes flying low.<sup>11</sup> The rear guns were to be used to create a barrage fire to protect the infantry. This could be either a standing barrage or a creeping barrage, which would advance in front of the infantry. Barrage fire could be used to harass the enemy and to deny time for supplies and reinforcements to move to the front. The best time to use this tactic was at night, but the manoeuvre needed careful preparation to succeed.<sup>12</sup>

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<sup>6</sup> *The employment of machine guns Jan. 1918*, p. 7.

<sup>7</sup> *Ibid.*

<sup>8</sup> *Ibid.*, p.10.

<sup>9</sup> *Ibid.*, p.11.

<sup>10</sup> *Ibid.*

<sup>11</sup> *Ibid.*

<sup>12</sup> *Ibid.*

The defensive use of the machine gun had been refined and was based on the principle of economy of force.<sup>13</sup> By this stage in the war, the Front was composed of several lines of defences. The front line was defended by small numbers of infantry armed with Lewis guns.<sup>14</sup> The second or support line was a continuous line held in strength by infantry. The reserve line was the main point of the defence and was based on an interconnected series of strong points. The machine guns were posted in the reserve line and were positioned to provide interlocking fields of fire.<sup>15</sup>

As can be seen from the above analysis of SS192, a major change had taken place in the use of machine guns. This did not happen in isolation. The Great War brought about sweeping changes in all aspects of warfare. New weapons were introduced – tanks, aircraft, and poison gas, while existing weapons were enhanced out of all proportion to pre-war capabilities. Machine guns and artillery fell into this category. Machine guns had been dismissed as mere weapons of opportunity, but by the end of the war they were seen as major contributors to victory. Practical experience of their capabilities had brought about this change and no amount of inertia or indecision could halt its progress.

Lindsay's influence in SS192 is quite clear. The idea of machine guns as 'economisers of men' was something that he had discussed before in his 'strategical [sic] paper' and elsewhere, and now he had a chance to incorporate his ideas into official doctrine.<sup>16</sup> The published manual was not without its detractors and Lindsay was frequently called upon to defend one of the core claims that it was trying to make. In a paper addressed to General Bonham-Carter he addressed the criticism levelled at the draft manual.<sup>17</sup> According to Lindsay, the tactical handling of machine guns was accepted but what he saw as one of the core topics in the manual was been changed by small alterations and interpolations by others. He had intended the manual to foster an 'esprit de corps' in the M.G.C. and to make gunners feel as if they were part of a 'real living entity of its own.'<sup>18</sup> Lindsay was concerned at the inclusion of a statement

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<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Paper on the Strategical & Tactical value of M.Gs, 9 Nov. 1915 (B.T.M., Lindsay Papers B1).

<sup>17</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Dec. 1917 (B.T.M., Lindsay Papers E2004.1999.C41).

<sup>18</sup> Ibid., p. 1.

that an officer should not look upon the Machine Gun Corps as his “regiment” and as his “home”, in the sense of the words that an artillery officer looks upon the “royal regiment” or an infantry officer on his regiment, but that he should merely regard it as a “stage” through which he passes on his way to higher command in some other sphere of service.<sup>19</sup>

This statement was unhelpful as it had the effect of draining the M.G.C. of trained senior officers at a time when they were badly needed. It also led some officers posted to the M.G.C. lose interest in the work which in turn had a negative effect on morale. Lindsay sought to have a proper system of promotion put in place to retain the officers in the machine gun service. In the belief that this would be a more efficient use of resources. The absence of senior machine gun officers in the General Staff was he asserted ‘one of the reasons for all mistakes, and delays that have occurred in the past.’<sup>20</sup>

Following the German assaults of March and April 1918 and the lessons learned during that period, thoughts turned to revising the manual. General Home asked Lindsay to comment on the new version of the manual. Lindsay described SS192

as a compromise between two opposite schools of thought. This has led to its being somewhat of a jumble, out of which conflicting opinions and contradictory statements protrude themselves. Some of it is, in my opinion, definitely false teaching, and some of it is so vague that it conveys little teaching at all.<sup>21</sup>

He went on to describe the two schools of thought, A and B. School A to which he belonged was a group of officers who had studied machine guns from the start of the war. According to this school, machine gun tactics are different from those associated with other arms and should be studied as such.<sup>22</sup> Lindsay summed up the doctrine of School A as follows:

- (a) In war FIRE is everything, the rest is of small account. (Napoleon)
- (b) It is FIRE which is decisive, and not NUMBERS. (Ludendorff)

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<sup>19</sup> Ibid., p. 2. Bonham-Carter was the Brigadier General in charge of training at G.H.Q. at the time.

<sup>20</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Dec. 1917 (B.T.M., Lindsay Papers E2004.1999.C41), p. 5.

<sup>21</sup> Letter regarding proof of ‘The tactical employment of machine guns’, 2 July 1918 (B.T.M., Lindsay Papers E2004.2138.D29).

<sup>22</sup> Ibid.

- (c) The light machine gun groups form the framework of the infantry attack. The heavy machine guns form the connecting link between the infantry on the one hand and the minenwerfer and field guns on the other, they are employed apart from the infantry. Machine guns can at times, to a certain extent, take the place of artillery. (Ludendorff)
- (d) That machine guns form the framework of a defensive system, the infantry defence being built up on that framework.
- (e) The necessity for a clear distinction between the primary functions and method of employment of the infantry weapon on the one hand and the machine gun proper on the other. (Notes on Recent Fighting No. 3 issued under G.H.Q. No. T/9, dated 10/4/18.)
- (f) The machine gun service must be regarded as a distinctive arms with tactics of its own. In all respects it is intermediate between the infantry and the artillery, its tactics being radically from the former, and approximating to, but not being identical with, the tactics of the latter. (First Army No. 1958(G) 10/5/18, Canadian Corps No. G.126/3-6. 30/4/18.
- (g) Though it is true that the principles of the military art are eternal, we must remember that the factors with which it has to deal, are undergoing incessant evolution. (Von der Goltz)<sup>23</sup>

Thus he summarised everything that he had worked on to date. He also stated that doctrine needed to be continually updated based on constant developments in the war. He then castigated those associated with School B, by saying that they do not agree with School A and were frightened

- (a) of creating a strong and permanent Machine Gun Corps, full of “esprit de corps” of its own.
- (b) of admitting the position and status of the Machine Gun Corps as a “distinctive Arm, with tactics of its own.”
- (c) of admitting that, unless you study machine gun tactics you are not in a position to write about them.
- (d) of indirect Fire, and Artillery methods being used with machine guns.
- (e) of allowing machine gunners to have the principal say in the organisation and tactical teaching of their own Arm.
- (f) of any large increase in the Machine Gun Corps, or in fact of any of those things which they designate as “auxiliary weapons”.<sup>24</sup>

Lindsay claimed that since School B had no doctrine or teaching of its own, their opposition had impeded the efficient development of the M.G.C.<sup>25</sup> He acknowledged

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<sup>23</sup> Letter regarding proof of “The tactical employment of machine guns”, 2 July 1918 (B.T.M., Lindsay Papers E2004.2138.D29).

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

that School A had won the debate, and their teachings were proven to be correct. Because of the competition between these schools, SS192, as published in January 1918, was criticised by Lindsay as ‘actually detrimental to efficiency and ‘esprit de corps’ and [he predicted] will lead to dissatisfaction among machine gunners.’<sup>26</sup>

Lindsay did admit that SS192 was written to conform with the principles under which the General Staff wanted to conduct operations in 1917, and that in mid-1918 a new set of circumstances had presented themselves which needed to be addressed. The defence by VI Corps, Third Army during March was described by Lindsay as the perfect example of a machine gun defence in depth. It was designed by Colonel Hewitt, the C.M.G.O. of the VI Corps, one of Lindsay’s disciples. This was not surprising as Hewitt had written the defence chapter of SS192.<sup>27</sup> However, this textbook defence by VI Corps was ignored in the new edition and that antedated March was still promoted. The Third Army had published an amendment to SS192 dated 18 June 1918; yet this was ignored. Lindsay stated that the chapter on open warfare appeared to have been written without any reference to the current war for all the notice it had taken of advances to the Hindenburg Line in early 1917, the Battle of Cambrai in November 1917, and the battles of March 1918.<sup>28</sup> He was dismayed to find that the new version which was being prepared in 1918 did not take the lessons from the recent fighting into account. Yet, he thought that it was too early to produce a total revision in mid-summer and that the General Staff should wait until the winter break to totally revise the booklet.<sup>29</sup> He suggested that instead of a complete revision of the manual, what was required at that moment were amendments and additions, noting the recent operations and the changes in fighting.<sup>30</sup> He wanted the new manual to be produced by experienced machine gun officers in the winter when the future direction of the war could be predicted by the General Staff. He was anxious to wait and do the job properly so as to avoid ‘wrong teaching’ taking place. He also wanted to make sure that School B had nothing to do with the revised text. He finished the letter to Horne by urging him to push for an officer

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<sup>26</sup> Ibid.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.



to be appointed to G.H.Q. who understood machine guns.<sup>31</sup> There is no record of a reply from Horne.<sup>32</sup>

Lindsay had a disagreement with his machine gun boss General Lucas over the redraft of SS192. Lucas had no machine gun experience when he was appointed B.G.G.S., M.G.C. and this was to cause problems for Lindsay and the machine gun service.<sup>33</sup> Lindsay always felt the service was hard-done by since no machine gunner was appointed to the senior role. It is unclear to whether he was looking to be appointed to the role himself, and if he was motivated by his passionate commitment to developing the use of machine guns. In defence of this General Staff role not being given to a machine gun officer, it should be noted that none of them had staff training at that stage of the war. Lindsay only attended Staff College in 1920.<sup>34</sup> In an undated handwritten paper in the Bovington archives, he sets out the issues on which he and Lucas differed. Entitled 'Criticism of attitude of Gen. Lucas ref. teaching of SS192, Part I, 1918', it is a very blunt and forthright piece of correspondence.<sup>35</sup> It was never published as it would probably have led to his being court martialed and subject to severe sanctions. What it does indicate is the level of frustration and despair that Lindsay felt around the role of B.G.G.S., M.G.C. Lindsay had welcomed the appointment of Lucas to the position and had urged his fellow officers to use the offices of the general to further the development of machine guns.<sup>36</sup> What happened to turn him against Lucas? According to Lindsay, Lucas had

Commenced at end of March by saying broadcast that the principles laid down in SS192, part I were wrong, that the book was a bad one, and already out of date, and that wrong teaching was being given at M.G. Schools.

Result:

(a) At first this shook the faith of many in all the teaching that had been laboriously built up over a long period and as no other teaching was provided to replace it, did a great deal of harm, & made the position of all teachers of M.G. work and

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<sup>31</sup> Ibid.

<sup>32</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919*

<sup>33</sup> Criticism of attitude of General Lucas regarding teaching of S.S.192, part I, 1918 (B.T.M., Lindsay Papers E2004.2375.E8).

<sup>34</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>35</sup> Criticism of attitude of General Lucas regarding teaching of S.S.192, part I, 1918 (B.T.M., Lindsay Papers E2004.2375.E8).

<sup>36</sup> Employment of machine guns in defence with copy of letter sent to Jackson, Charteris and Hewitt, 13 Apr. 1918 (B.T.M., Lindsay Papers E2004.2054.D3).

M.G. Battalion commanders (all of whom had been trained on these principles) very difficult.

- (b) Later having no other teaching to suggest in its place, being unable to evolve anything for himself, finding the mass of thoughtful M.G. opinion against him, and realising that all those who had been most successful in the March and April fighting were adhering to it, he tacitly allowed the old teaching to continue, but at the same time did his best to impede it by continuing to assert that the principles on which it was being conducted, namely those laid down in SS192, were wrong.<sup>37</sup>

Lindsay asserted that Lucas had ‘rattled’ the War Office over machine gun teaching and that he wanted a new manual produced. However, he did not want a machine gunner to write it. A new draft manual was produced, but according to Lindsay it turned out to be a ‘complete fiasco’ and Lucas had to turn to Lindsay and the other authors of the original SS 192 to complete it.<sup>38</sup> Lucas apparently took the view that machine guns were ‘not useful as an offensive weapon in the attack and that machine guns in the attack should be allotted definitely to infantry battalions.’<sup>39</sup> This ran totally contrary to the lessons derived from experience of the war down to that point and contradicted machine gun teaching. Lindsay was also incensed by Lucas’s assertion that the offensive resources of the M.G.C. were sufficient. Lindsay stressed that the offensive capability of the M.G.C. needed to be enhanced to provide fire power for the infantry once they had advanced beyond the range of the artillery. Lucas was opposed to the position of the C.M.G.O. and argued that it should be abolished: that put him into direct opposition to the majority of the army and corps commanders and he had to reverse this decision after a meeting with General Horne.<sup>40</sup> Lindsay was unhappy with Lucas for failing to achieve any sort of recognition for the work of the Corps in the press, and complained that the only praise received was from the German, General Ludendorff, who recognised the valuable contribution of the M.G.C. in stopping his attacks in March and April.<sup>41</sup> Lindsay concluded by asserting that ‘his want of knowledge and sympathy is widely recognised throughout the Corps, he has done and is doing, very great harm to the machine gun

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<sup>37</sup> Criticism of attitude of General Lucas regarding teaching of S.S.192, part I, 1918 (B.T.M., Lindsay Papers E2004.2375.E8).

<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> Criticism of attitude of General Lucas regarding teaching of S.S.192, part I, 1918 (B.T.M., Lindsay Papers E2004.2375.E8).

<sup>41</sup> Letter regarding proof of ‘The tactical employment of machine guns’, 2 July 1918 (B.T.M., Lindsay Papers E2004.2138.D29).

service generally.<sup>42</sup> A damning assessment but one that was largely true. There was an attempt to produce a new manual which was never completed before the end of the war. Luckily for Lindsay and the M.G.C. he had friends and supporters in high places, one of whom was General Horne.<sup>43</sup> This exchange with General Lucas clearly shows the administrative morass with which the M.G.C. had to contend. Just when good leadership was required at G.H.Q. to advance machine gun doctrine, it failed to materialise and as a result machine guns were blocked from developing their full potential. However, this was not so in the Canadian Corps where Brutinel was able to put machine gun technology at the forefront of the battle.

In a move that aggravated these tensions between the two men, Lindsay was commissioned by Lucas in July 1918 to redraft SS192.<sup>44</sup> Lucas wanted the publication to be as short and concise as possible. It was to deal with principles so as to be applicable to all theatres of war. 'Organisation' was to be dealt with in a very general manner and 'command and liaison' was to include only general principles.<sup>45</sup> He attached documents issued by G.H.Q. on the subject of machine guns and warned Lindsay that any modifications from these principles needed to be agreed with him before including them in the manual.<sup>46</sup> Lucas noted that the chapter on machine guns in the attack would be deferred pending policy decisions to be issued by G.H.Q. with regard to the employment of all arms in the attack. Interestingly Lucas wanted to commission Brutinel to write a chapter on motor machine guns.<sup>47</sup> He imposed further restrictions on Lindsay with regard to standard machine gun terms. He wanted terms like 'battery', 'forward guns' 'rear guns' and so on to be replaced by more general terms.<sup>48</sup> The problem with that simple request was that the troops of the M.G.C. understood those terms and knew what they meant. Replacing them with a new vocabulary was going to confuse them unnecessarily.

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<sup>42</sup> Ibid.

<sup>43</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* (Farnham, Ashgate, 2010), pp 289-90.

<sup>44</sup> Cuthbert T. Lucas to G. Lindsay, 9 July 1917 in correspondence with General Lucas; Brutinel; Horne; Lindsay, 9 July 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

<sup>45</sup> Ibid. .

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.



Figure 21: Brigadier General Cuthbert T. Lucas.

Source: <https://pbs.twimg.com/media/Btz427wCMAAz67y.jpg:large> (2 Oct. 2014).

Lucas wrote to Lindsay in August 1918 asking him for a copy of his work on the manual. Knowing it was a draft and still incomplete, he assured Lindsay that it was ‘most undesirable to get it out until it is satisfactory from all points of view, and I have not the slightest intention of hurrying you.’<sup>49</sup> However, he stated that G.H.Q. wanted the manual published in September, and he needed the draft so the most debatable points could be sorted out with the General Staff.<sup>50</sup> At the end of the letter he sought to placate Lindsay with some praise

I don’t suppose you worry about being marked for jobs like this, but I should like you to realise that your work is fully appreciated. You suffer from being the only person capable of doing it, so everyone takes advantage of you.<sup>51</sup>

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<sup>49</sup> Cuthbert T. Lucas to G. Lindsay, 9 July 1917 in correspondence with General Lucas; Brutinel; Horne; Lindsay, 9 July 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

Lindsay replied immediately. He advised Lucas that he could not finish the redraft of SS192 as he had just been appointed to command Lindsay's Brigade for the upcoming Battle of Arras.<sup>52</sup> Instead, he sent Lucas a separate paper that he felt could be published as an addendum to SS192 and would cover both the new fighting and training.<sup>53</sup> The paper was compiled from a study of the operations from March 1918 up to and including the recent Battle of Amiens. Input was received from Brutinel, the D.I.M.G.U. of the 4<sup>th</sup> Army and other senior machine gun officers. To Lindsay, the paper was an accumulation of all machine gun experience in the war to date and he urged Lucas to have it published as it stood. Lindsay stated that it amplified SS192, Part I, in all aspects that required amplification and it would settle once and for all:

- a) The question of the status of the Machine Gun Corps, and the place of the machine gun in the scheme of all arms.
- b) The question of Command, distribution, and liaison
- c) It will provide all the information necessary for training, both here and in England.
- d) Once it is published, all contentious points will be settled, and the preparations of a complete re-draft of SS192, Part I, at a later date will be easy to carry out.<sup>54</sup>

He warned about the consequences of not publishing the paper and said that confusion around correct handling would continue to the detriment of the machine gun service. He believed that SS192 should continue to be used. Indeed, he declared that any new set of guidelines should be used in tandem with it and not fully replace it. He thought that if this new paper was published at this time 'all difficulties will be smoothed away like magic, argument and confusion of thought will cease, and the complete re-drafting of SS192, Part I, when this year's active operations are over will be a simple matter, and we can produce the best SS that has been produced in the war.'<sup>55</sup>

Following on from Lindsay's letter, General Horne rowed into the debate. He forwarded Lindsay's paper to G.H.Q. and stated that he was in broad agreement with the

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<sup>52</sup> Correspondence with General Lucas; Brutinel; Horne; Lindsay, 27 Aug. 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

<sup>53</sup> The paper was entitled 'The employment of machine guns in offensive operations' and is listed in Bovington in file E2004.3117.

<sup>54</sup> Ibid.

<sup>55</sup> Correspondence with General Lucas; Brutinel; Horne; Lindsay, 27 Aug. 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

principles set out in it.<sup>56</sup> He wanted it published straight away instead of waiting for a redraft of SS192 for the following reasons. To him there was still confusion as to the status, the system of command and the distribution of the M.G.C. He believed there was still a tendency to attach sections or even smaller units of machine guns to infantry battalions when they should really be used as divisional troops. Finally, he agreed that machine gun training in cooperation with other arms needed to commence immediately and ought not to be contingent on the redraft of SS192. To him, time was of the essence.<sup>57</sup> In the end the problem of the redraft was abandoned after Lucas was transferred to the command of the 4<sup>th</sup> Division in October 1918. As it was his scheme and he was the one pushing for it the impetus was lost and the planned revision shelved.

Once Lucas was replaced Lindsay lost no time appraising General Charles Deedes, Deputy Director of Staff Duties, about publication of the new SS192. He accepted that the General Staff wanted to push ahead with a complete redraft but wrote to Deedes in a personal capacity to enquire if he could have some influence in the matter.<sup>58</sup> Although this approach came to nothing, it demonstrates Lindsay's determination to push his ideas forward.

Conflict with the General Staff was to dog Lindsay right up to the end of the war and even after it. He was somewhat annoyed that he did not receive any credit for his ground breaking work on machine gun doctrine.<sup>59</sup> In correspondence with Deedes, he documented how over the course of the war he strove to improve the machine gun service at every opportunity. However these ideas 'were in disagreement with those held by many in authority, and that therefore I incurred the penalty of being looked upon, either as a dangerous fanatic or a visionary idiot, by many people.'<sup>60</sup> By the end of the war Lindsay thought that as his theories had been proven to be correct, this opposition to him would abate. He was acutely conscious that 'had some claim to a reputation for a certain amount of intelligence and foresight, and to the possession of the ability to make the correct deductions from a study of military events.'<sup>61</sup> He

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<sup>56</sup> H.S. Horne to G.H.Q., 6 Sept. 1917 in correspondence with General Lucas; Brutinel; Horne; Lindsay, 27 Aug. 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

<sup>57</sup> Ibid.

<sup>58</sup> George Lindsay to Charles Deedes, 8 Oct. 1917 in correspondence with General Lucas; Brutinel; Horne; Lindsay, 27 Aug. 1918 (B.T.M., Lindsay Papers E2004.2376.E9).

<sup>59</sup> Correspondence and text regarding lectures in England and the controversy about them, 3 Mar. 1919 (B.T.M., Lindsay Papers E2004.2743).

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

found to his horror, however, that others did not share his views. He was called home to Grantham in October 1918 to lecture at a senior officers' course. Thereafter, he was sent for by the War Office and to his dismay found that he was accused of been 'suspect' and 'preaching and spreading propaganda at variance with the accepted doctrine of the higher command and General Staff.'<sup>62</sup>

The controversy that got Lindsay into bother was the control of the guns by the machine gun commander. In his lectures Lindsay referred to different solutions to this problem being issued by the various British armies in the field. Pending agreement on the issue by the War Office, some Army commanders issued their own instructions to their forces. The Director of Staff Duties, General Arthur Lynden-Bell, did not want this issue to be raised by Lindsay as he thought it would only cause confusion.<sup>63</sup> Charles Hewitt, General Lynden-Bell's assistant, conveyed Lynden-Bell's news to Lindsay

He wishes me, however, to say that he considers you would be taking the wrong course if you endeavour to force by means of propaganda amongst the audience to which you may lecture, any opinions you may hold and which you may consider have not received due consideration of the General Staff, or which you may know are not in accordance with the policy on this subject.<sup>64</sup>

Hewitt finished by saying that Lynden-Bell recognised the great assistance that Lindsay had contributed to the General Staff during the war.<sup>65</sup> Lindsay raised the matter with his army commander, Major General Anderson, who promised he would enquire on his behalf. Lindsay admitted that he used every means at his disposal to convey his ideas and objected to the fact this was somehow being held against him by senior officers who bore him a grudge. Lucas was definitely one of them. In defence of his reputation, Lindsay outlined his work in the field of machine guns throughout the war and emphasised that he always taught in accordance with the ideas of the General Staff. He was staying in the army as a career soldier and was concerned that his good name should be upheld. He wanted a say in the future development of machine guns, and was concerned that this controversy would prevent him from doing so in the future.<sup>66</sup> He received a reply from

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<sup>62</sup> Ibid.

<sup>63</sup> Ibid.

<sup>64</sup> Ibid.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

Deedes on 6 March 1919, telling him not to worry about his future career, that his expertise on machine guns was well recognised by those in authority, and that he should look upon this episode as something that all specialist lecturers have to put up with from time to time.<sup>67</sup>



Figure 22: Mule-drawn guns and limbers of the Machine Gun Corps galloping along the road, Romby, 13 May 1918.  
Source: I.W.M. (Q 3266).

#### COMMAND AND CONTROL WITHIN THE MACHINE GUN CORPS

A key component of machine gun doctrine is the organisation and control of the guns. This control was vested in machine gun officers whose influence grew throughout the war. In 1914 these officers tended to be junior lieutenants with a section of two guns but their roles expanded throughout the conflict. With the establishment of a machine gun company attached to brigades in 1915, their command was overseen by a Brigade Machine Gun Officer (B.G.M.O.).<sup>68</sup> The role

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<sup>67</sup> Ibid.

<sup>68</sup> Wright, *Machine gun tactics & organization*, p. 307.



of the Brigade Machine Gun Officer was an odd one. While nominally in command of a brigade's machine guns, the B.G.M.O. had to confer with the brigade commander before making decisions. He could only give advice on the tactical deployment of his guns if asked. Typically, he was a major or a captain. Although he was responsible for the machine gun company often he did not control them in battle as they tended to be attached to other commands. It was only late in the war, when a fourth machine gun company was added to a brigade to form a full sized machine gun battalion, that the B.M.G.O. became a Divisional Machine Gun Officer and had troops directly under his control.<sup>69</sup> This model of dual control did not always work as the manual intended. Indeed, there are many recorded instances of misunderstandings that occurred. The primary function of the B.M.G.O. was the tactical deployment of the brigade machine guns to ensure that they were used to their full potential. R.M. Wright describes this arrangement of the B.M.G.O. as 'having to serve God and Mammon, the brigade and the D.M.G.O; and there was grave danger of his holding to the one and despising the other.'<sup>70</sup>

This problem of no executive power for the D.M.G.O. was to lead to the establishment of a machine gun battalion which was independent of brigade authority except when sections were attached for tactical purposes. G.S. Hutchinson, D.M.G.O. of the 33<sup>rd</sup> Division, described the role of the D.M.G.O. as a ludicrous position.<sup>71</sup> To him one should either have control or not, and this concept of dual control was seen to be problematic. He wrote 'in the Army, one gives or receives orders; one neither gives nor receives advice. The giver, at any rate, is likely to be told to mind his own business.'<sup>72</sup> Hutchinson recalled an occasion in October 1917, when it took him from 6 p.m. one evening till 2 a.m. the following morning to convince the company commanders to release their machine guns to his control for an attack that day.<sup>73</sup>

In late 1916 the role of Corps Machine Gun Officer (C.M.G.O.) was created to coordinate the work of Corps machine guns. This was a senior post and one of the first officers appointed was R.V.K. Applin when he was posted to be C.M.G.O. of

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<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> Hutchinson, *Machine guns*, p. 181.

<sup>72</sup> Ibid.

<sup>73</sup> Harvey, *Collision of empires*, p. 374.

the II ANZAC, a part of the Second Army in early 1917.<sup>74</sup> A Canadian job specification for the role of C.M.G.O. noted the increased responsibility over the role of the B.M.G.O.<sup>75</sup> From now on, the C.M.G.O. would be responsible for the tactical training of machine gun companies out of the line. He would ensure that a sound doctrine regarding the principles of handling machine guns was spread throughout the infantry, and he was charged with overseeing the promotion and appointment of officers within the machine gun companies.<sup>76</sup> In the Canadian Corps, the C.M.G.O. was authorised to exercise executive command over such machine gun units of the Corps as may be placed under his orders by the Corps Commander for the purpose.<sup>77</sup> In addition to the above, the British job specification for the role of C.M.G.O. included advising on the adequacy of existing and new experimental equipment and compiling the Corps Machine Gun summary, including experience of recent fighting from a machine gun point of view.<sup>78</sup> The British specification noted that all directives concerning instructions relating to operations and training would come from the General Staff and all administrative matters would come from the administrative branch of the Corps Staff.<sup>79</sup>

The problem with this appointment at the time was that the C.M.G.O., unlike the more junior B.M.G.O., had no direct control of troops. He was appointed in an advisory capacity – admittedly at a higher grade but still with restrictions. Lindsay drew attention to the problematic nature of this role stating that awkward appointment when he wrote ‘unless he was a man of exceptional personality and force of character, his position was one in which it was almost impossible for him to achieve any useful purpose.’<sup>80</sup> However, most senior Corps commanders recognised the incumbents, expertise and allowed them to get on with their job without undue interference. A fine example of this was Applin and his planning for the Battle of Messines. He was allowed complete control over the machine guns of II ANZAC by

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<sup>74</sup> See chapter on Applin.

<sup>75</sup> *War diary, Machine Gun Officer Canadian Corps November 1916 to June 1917*, Appendix A, Canadian Great War Project.

<sup>76</sup> *Ibid.*

<sup>77</sup> *Ibid.*

<sup>78</sup> Letter from General Headquarters regarding the establishment & appointment of Division Machine Gun Officers, May 1917 (B.T.M., Lindsay Papers E2004.1971.C33).

<sup>79</sup> *Ibid.*

<sup>80</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Dec. 1917 (B.T.M., Lindsay Papers E2004.1999.C41), p. 13.

General Sir Alexander Godley. The inherent problematic nature of this command was corrected when a new command layer was created with the appointment of Divisional Machine Gun Officers in June 1917. Finally, there was an appropriate line command from corps to division to brigade but no sooner had this structure been put in place than the post of C.M.G.O. was abolished. The discussions about the relative roles of D.M.G.O. versus C.M.G.O. began in May 1917, when General Wigram wrote to Corps commanders seeking their views on the retention of C.M.G.O.s given the creation of a new post of D.M.G.O. at a lower level of command.<sup>81</sup>

Five Corps or Army commanders replied General Horne of the First Army wanted to retain both positions, whereas General A. Holland, Commander of the I Corps was willing to allow the D.M.G.O. assume the role of the C.M.G.O. and therefore abolish the latter post but qualified this by stating that if the Corps post was to be retained, it was to be graded as a staff officer.<sup>82</sup> General Byng of the Canadian Corps was fully in favour of an officer appointed at the division level in order to support the infantry commanders as they did not possess the technical knowledge to utilise machine guns to their best advantage.<sup>83</sup> He also sought to retain his C.M.G.O. who was, in fact, Brutinel. The commander of XI Corps, General R. Haking, replied that he wanted to keep both posts.<sup>84</sup> Lieutenant General W. Congreve, Commander of the XIII Corps went further and recommended that not only should there be a D.M.G.O and C.M.G.O. there should also be an officer appointed at Army level and a chief at G.H.Q. 'to add to the efficiency and esprit of the Machine Gun Corps.'<sup>85</sup>

Based on these submissions, it was formally decided to appoint D.M.G.O.s with the rank of major to each division. Each D.M.G.O. would have direct command of the fourth machine gun company of each division and liaise with the three infantry brigade commanders with regard to their machine gun companies. The letter of authorisation issued in June 1917 noted that the D.G.M.O. would perform the same duties as the C.M.G.O. but at a lower level. The post of C.M.G.O. was to be retained

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<sup>81</sup> Letter from General Headquarters regarding the establishment & appointment of Division Machine Gun Officers, May 1917 (B.T.M., Lindsay Papers E2004.1971.C33).

<sup>82</sup> Ibid.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

for a period of three months from June 1917 with the rank of lieutenant colonel.<sup>86</sup> However, on 18 July 1917 the approval for the post of C.M.G.O. was cancelled by the Army Council and the role was assumed by the D.M.G.O.<sup>87</sup> There was no explanation given for the reversal but it is understood to have been related to the number of lieutenant colonels being created. But whereas, there does seem to have been a reluctance to establish extra senior posts at this time in the British Army, and A.D. Harvey in his book *Collision of empires: Britain in three world wars, 1793-1945* alludes to this, that there was an increase in the number of lieutenant colonels in the M.G.C. from two substantive and twenty acting in January 1918 to sixty-nine substantive and eighteen acting in December 1918.<sup>88</sup> General Horne was furious with the decision and wrote to G.H.Q. to protest strongly.<sup>89</sup> He stressed the importance of the role and how this was demonstrated by the success of the Canadians at Vimy Ridge. He also cited that the recently issued manual *Notes on employment of machine guns OB/1432* mentioned the importance of such a role.<sup>90</sup> He could not understand the decision and continually sought the reinstatement of the post. He was, no doubt, influenced by his relationship with Lindsay and saw at first hand the results that a senior machine gun officer could produce.

The row over the role of the C.M.G.O. was to rumble on for the rest of the war.<sup>91</sup> In March 1918 G.H.Q. announced the creation of the post of Brigadier General, Machine Gun Corps and the post of Colonel, Machine Gun Corps in each army. In order to enable machine gun officers to qualify as General Staff officers, they were to be afforded every opportunity to learn general staff work. Special courses were run in the Machine Gun School for General Staff Officers Grade 2 to qualify to undertake the work of Corps Machine Gun Officers once the positions were abolished.<sup>92</sup> The Brigadier General was required to advise the General Staff on questions of war organisation, tactical employment and the training of machine

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<sup>86</sup> Letter from General Headquarters regarding the establishment & appointment of Division Machine Gun Officers, July 1917 (B.T.M., Lindsay Papers E2004.1971.C35).

<sup>87</sup> Ibid.

<sup>88</sup> Harvey, *Collision of empires*, p. 375.

<sup>89</sup> Letter from General Headquarters regarding the establishment & appointment of Division Machine Gun Officers, Aug. and Sept. 1917 (B.T.M., Lindsay Papers E2004.1971.C35).

<sup>90</sup> Ibid.

<sup>91</sup> Correspondence concerning the abolition of C.M.G.O.s, May 1918 (B.T.M., Lindsay Papers E2004.2387.E18).

<sup>92</sup> Ibid. Lindsay attended his Staff course in 1920.

gunners, and to submit recommendations for the allocation of machine gun units to meet requirements.<sup>93</sup> He was also responsible for the Machine Gun School at Camiers but not Grantham which remained part of the War Office. The ‘Colonel M.G.C. with an Army’ was to be an advisory position with no direct command of troops. He was to be at the disposal of the army commander to advise on all machine gun matters.<sup>94</sup> He was authorised to visit all machine gun units in the field which led to the title of the post being changed to Deputy Inspector Machine Gun Units, D.I.M.G.U., which was a bit of a mouthful.<sup>95</sup> The authorisation for these posts was something that Lindsay had been pushing for, for some time and finally, his lobbying had proved worthwhile. Sanction for the post of C.M.G.O. was granted in August 1918, but was once again cancelled on 31 October 1918 when it was reinstated on 4 November 1918, sanction was for a post graded as General Staff 2<sup>nd</sup> Grade.<sup>96</sup> There was a suggestion that the duties of the C.M.G.O. could be carried out by the General Staff Officer 2<sup>nd</sup> Grade (Training) within the Corps. This was opposed by several senior generals who campaigned for the retention of the post. General Byng, commander of the Third Army, wrote to G.H.Q. strongly recommending the retention of the post in June 1918.<sup>97</sup> He emphasised that at this stage of the war, the Corps was becoming the permanent fighting unit due to the continuing change of divisions within Corps and the gradual weakening of the divisions themselves. This was putting more strain on the Corps headquarters so it was vital to maintain a machine gun presence at that level.<sup>98</sup> General Horne argued that the role of training and machine guns could not be combined and if they were, neither would be done correctly. He stressed that machine gun matters could only be led by officers who understood how they operated and were properly trained. He also wanted the title D.I.M.G.U. changed as he considered it rather meaningless.<sup>99</sup>

Lindsay was appointed D.I.M.G.U. in the First Army in January 1918.<sup>100</sup> In April 1918, he signed himself as Army Machine Gun Officer, A.M.G.O. Tim Travers

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<sup>93</sup> Ibid.

<sup>94</sup> Correspondence concerning the abolition of C.M.G.O.s, May 1918 (B.T.M., Lindsay Papers E2004.2387.E18).

<sup>95</sup> Ibid.

<sup>96</sup> Ibid.

<sup>97</sup> Ibid.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid.

<sup>100</sup> Ibid.

has noted that this delay by the General Staff in sanctioning these higher level posts for the M.G.C. was not untypical and occurred in the very same manner in the Tank Corps. The General Staff after a while accepted the importance of the weapon but delayed the appointment of senior officers to run it.<sup>101</sup> Some commanders circumvented this inaction by the General Staff by appointing their own D.M.G.O.s. Lieutenant General Haldane of the VI Corps made this decision in 1917 when he recognised that ‘a Divisional Machine Gun Officer is badly wanted, but GHQ are behind the times as regards the question of machine guns and terribly conservative. They still think in terms of the time when we had two guns per battalion.’<sup>102</sup> Travers quite rightly points out that this delay in accepting of new weapons was partly due to the absence of an independent group at G.H.Q. or the War Office to evaluate new weapons and develop doctrine. Instead, senior generals were primarily concerned with fighting the war with the result that new doctrine suffered.<sup>103</sup> Indeed, this fuss around with the appointment of senior machine gun officers was a case in point. Having been proposed in 1915 by Lindsay and Baker-Carr, yet it was only sanctioned in the last months of the war.

Andrew (Andy) Simpson has written that ‘the role of the British corps command expanded considerably, as corps developed from being a relatively unimportant, administrative link in the chain of command, to playing a central role in the organisation of operations and acting as the highest level of operational command.’<sup>104</sup> In tandem with this expansion of the corps organisational structure the role of the C.M.G.O. also changed. In some instances, Simpson notes that the planning for the use of machine guns during offensives was organised by the C.M.G.O. and in other instances, the D.M.G.O. took responsibility.<sup>105</sup> According to Simpson, this switch made sense because he believes that machine guns were capable of use at a far lower tactical level than artillery and to concentrate their command at corps would have rendered them inappropriately inflexible at the tactical divisional level.<sup>106</sup> To him the role of the C.M.G.O. was similar to the role

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<sup>101</sup> Travers, *How the War was Won*, p. 47.

<sup>102</sup> *Ibid.*, p. 47.

<sup>103</sup> *Ibid.*, p. 47.

<sup>104</sup> Andy Simpson, ‘British Corps command on the Western Front, 1914-1918’ in Gary, Sheffield and Dan, Todman, *Command and control on the Western Front the British Army’s experience 1914-1918* (Kent, 2004) p. 97.

<sup>105</sup> Simpson, ‘The operational role of British corps command on the Western Front, 1914-18’ pp 91, 95, 100, 106, 115, 121, 137, 189.

<sup>106</sup> *Ibid.*, p. 100.

of the General Officer Commanding Royal Artillery, G.O.C.R.A. who had control of the corps artillery, which was a corps asset.<sup>107</sup> However, Simpson does note that this switching of authority between D.M.G.O. and C.M.G.O. caused problems. He also contends that the X Corps, C.M.G.O. Lieutenant Colonel H.F. Bidder, downplayed his role in favour of the D.M.G.O. during operations in July 1917.<sup>108</sup>



Figure 23: General Henry Horne, Commander of the First Army, with Staff Officers of the Machine Gun Corps, Robecq, 12 June 1918. Lindsay is the officer on the left.  
Source: I.W.M. (Q9018).

Brigadier General Edmund Ironside was appointed Brigadier General, Machine Guns in January 1918, then General Cuthbert Lucas in March 1918 and finally General T. Reddy in October 1918. Lindsay welcomed the appointment of Lucas in April 1918 and believed that finally the Corps had a recognised head which could lead the direction of machine gun doctrine. In correspondence with other senior machine gun officers he was optimistic that now ideas should be channelled through Lucas to G.H.Q. This would streamline the process and also allow Lucas to

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<sup>107</sup> Ibid., p. 91.

<sup>108</sup> Ibid., p. 130.

be totally *au fait* with the situation in the field.<sup>109</sup> This was a huge improvement on previous occasions when each machine gun officer with an idea would correspond with G.H.Q. directly and run the risk of his ideas being rejected. He believed that only items of ‘propaganda work regarding the big principles which some of us have been working for unceasingly during the last three years’ should be addressed directly to Lucas while other more mundane items should be dealt with by way of conference with field officers, officers from G.H.Q. and officers from Grantham and Camiers.<sup>110</sup> This call led to the holding of regular machine gun conferences. However, Lindsay was to change his opinion of Lucas quite quickly after meeting him.

William Philpott has challenged the idea that the British Army went through a ‘learning curve’ during the First World War. He has declared that ‘the ‘learning curve’ has now had its day, being too amorphous a concept, and too Anglo-centric a debate, to do justice to the fundamental rethinking of warfare that occurred between 1914 and 1918.’<sup>111</sup> He believes that the formulation is too one-dimensional and that the ‘learning’ is only one aspect of the process of transformation and the concept of a ‘curve’ assumes a steady rise whereas what happened in reality was ‘a more up-and-down, dynamic process of adjustment to new technologies, more sophisticated and flexible tactics, novel operational doctrines, complex logistics and fundamental change in the systems of command, control, communications and intelligence.’<sup>112</sup> Philpott further claims ‘there was no single praxis, but rather adaptation to the mutable, challenging and dynamic situations likely to be encountered in the field: that the set-piece battle required a different method to the encounter or the follow-up engagement, all of which confronted the British Army once war became mobile again in 1918.’<sup>113</sup> The British Army of 1918 had changed fundamentally from the one of 1914. It was much better at what it did but also it did things entirely differently as it learned the hard way through the maelstrom of trench warfare.<sup>114</sup>

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<sup>109</sup> Employment of machine guns in defence with copy of letter sent to Jackson, Charteris and Hewitt, 13 Apr. 1918 (B.T.M., Lindsay Papers E2004.2054.D3).

<sup>110</sup> Ibid.

<sup>111</sup> Philpott, ‘Beyond the ‘Learning Curve’: The British Army’s Military Transformation in the First World War’

<sup>112</sup> Ibid.

<sup>113</sup> Ibid.

<sup>114</sup> Ibid.



Philpott speaking after the Battle of the Somme maintains that only by trial and error after battling a skilled and stubborn foe ‘could the talented rise to the top in the short time available and the expanded army develop an effective system of devolved operational command.’<sup>115</sup> This is what happened with the development of machine gun doctrine during the war. For example, the stop start nature of the establishment of the posts of D.M.G.O.’s versus C.M.G.O.’s is an ideal example of what Philpott was suggesting. The talented officers rose to the top but it was never straightforward.

#### FINAL COMPONENTS OF DOCTRINE- CONFERENCES, MACHINE GUN BATTALIONS, BARRAGE FIRE AND NEW TACTICS

A series of monthly machine gun conferences were held during 1918. Attended by all senior machine gun officers in the British Army, their purpose was to develop machine gun doctrine in the most efficient manner.<sup>116</sup> Lindsay was very much to the fore in the discussions that took place. Under the chairmanship of Brigadier General Lucas, all manner of items were discussed. Machine gun officers from the field armies had a chance to meet with commandants of the machine gun schools from Grantham and Camiers. This level of interaction allowed for exchange of ideas to take place. These meetings were beneficial in concentrating the minds of busy officers who were trying to adapt machine guns to a rapidly changing war situation. They were held when the tactical situation was changing day by day. The first was convened on 15 June 1918 when thirty-two agenda items were tabled. A sample of some of the more interesting items is contained in figure 24. A review of the issues discussed demonstrates several matters. One is the amount of minute detail and routine issues that need to be attended to in order to make an army work effectively. The other is the amount of work required to make the M.G.C. efficient. As the M.G.C. was a relatively new organisation it did not

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<sup>115</sup> Peter, Simkins, *From the Somme to victory the British Army's experience on the Western Front 1916-1918* (Barnsley, 2014) p. 57.

<sup>116</sup> G.H.Q. machine gun conferences, 23 Sept. 1918 (B.T.M., Lindsay Papers E2004.2107.D19). The fourth conference was attended by four D.I.M.G.U.s. They were Colonel Lindsay First Army, Colonel C.H. Jackson Second Army, Colonel R.G. Clarke Third Army, Colonel A.G. Somerville Fifth Army and chaired by Brigadier General Cuthbert Lucas, Inspector of Machine Gun Units. There were also officers in attendance from the War Office, G.H.Q. and the commandant of M.G.T.C. Grantham, Brigadier General R.O. Kellett. Kellett was Officer Commanding 99<sup>th</sup> Brigade during 1916 when Lindsay was Brigade Major.

have the traditional structures and supports enjoyed by other established units, with the result that valuable officer time was taken up with routine issues.

Agenda	Note of action taken
1. The function and control of a machine gun battalion detached from its division. (4 <sup>th</sup> Army)	1. The control of machine gun battalions has already been laid down on broad lines: the employment of these battalions is a question to be decided by the Armies themselves
3. That the most useful position for the Divisional Machine Gun Commander in action is often on the line of the advanced Brigade H.Q. and that of the Group Commander on the line of Infantry Battalion H.Q. (2 <sup>nd</sup> Army)	3. This is mainly a question of (a) liaison with the commander to whom the officer is attached and (b) efficiency and economy of communications. The Machine Gun Battalion H.Q. and the Group Commander's H.Q. should be in close proximity to Divisional and Brigade H.Q. This does not mean the C.O. and the Group commander should always remain at their headquarters; but when away, should leave someone to represent them
10. Provision of a riding horse for the M.G. Battalion medical officer (4 <sup>th</sup> Army)	10. The War Office have been asked to sanction this. Reply not yet received
14. That an increase in the number of sanitary men on the establishment of H.Q. of a M.G. Battalion is desirable (2 <sup>nd</sup> Army)	14. This will not be considered as it entails an increase in establishment.
24. The desirability of arranging that battalion commanders at M.G.T.C. should be interchangeable with battalion commanders in the field, and that appointments to commands at the M.G.T.C. should be made from officers of the M.G. C. who have done good service in the field. (1 <sup>st</sup> Army)	24. This is being done at present It is calculated that to allow all commanding officers to remain at Grantham for six months, an interchange every three weeks is now required. It was suggested that a memo to this effect should be sent to Armies, so that they could select commanding officers who require a rest.

Figure 24: Table of sample agenda items from conference of Deputy Inspectors Machine Gun Units at G.H.Q., 15 June 1918.

Source: G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E2004.2107 D19).

These conferences are very revealing in relation to the process of development of machine gun doctrine. One can trace how thought processes evolved as they sat down and discussed the issues. The constraints that they operated under are clearly evident. For example, the seemingly innocent request for extra sanitary personnel was refused

because it would have added additional staff to the battalion complement and that was fixed by a War Office decree and that could not be changed.<sup>117</sup> There was also the ridiculous request for a horse for the medical officer which had to go to the War Office. This type of thing did not happen where the Royal Artillery were concerned.<sup>118</sup>

Military conferences were common in the British Army, but some of the issues addressed by the machine gun officers were rather trivial. In preparation for the first conference, Lindsay wrote that he did not consider it necessary to bring forward minor points such as minor questions relating to personnel or technical requirements.<sup>119</sup> However, other officers seem to have taken a different view - hence the thirty-two items on the agenda for the first meeting. An analysis of the agenda items for all of the meetings during 1918, (in table 25), shows that Lindsay brought fewer queries to the meetings (10.57% of the total). His queries were usually in relation to equipment and establishment issues.<sup>120</sup> Lindsay was quite clearly seen as the more senior experienced machine gun officer at this time on the basis of the strategic focus of his questions. This forum allowed Lindsay to divulge his extensive knowledge to other less experienced officers. His expertise was clearly evident and he was seen as the officer with the understanding and expertise to address the issues. He was the one officer that continually held his post during this period because he had the required experience. One of the questions that he wanted addressed was the quality of officer being sent to the M.G.C. He wanted either to have a machine gun cadet battalion established or a more drastic system of weeding out unsuitable office candidates imposed.<sup>121</sup> The last agenda item from the meeting dated 25 November 1918 was from Lindsay. He proposed 'that in the post-war organisation of the Machine Gun Corps, the adoption of the present Canadian organisation should be considered.' The reply noted that certain proposals would be outlined by the General Staff and forwarded to the War Office.<sup>122</sup> This was the greatest compliment that could be paid to Brutinel, the idea that a Dominion army structure could be adopted by the British Army.

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<sup>117</sup> G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E2004.2107 D19).

<sup>118</sup> *Ibid.*

<sup>119</sup> G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E2004.2107.D19).

<sup>120</sup> G.H.Q. machine gun conferences, 1918 (B.T.M., Lindsay Papers E2004.2107, D19).

<sup>121</sup> G.H.Q. machine gun conferences, 23 Sept. 1918 (B.T.M., Lindsay Papers E2004.2107.D19).

<sup>122</sup> *Ibid.*

		1st Army	2nd Army	3rd Army	4th Army	5th Army	C. In C.	Q.M.G	M.G.T.C.	Total	
First Conference 15 June 1918	Organisation & Policy		1		2					3	
	Personnel				4					4	
	Establishments	1	3		3					7	
	Equipment		1		2					3	
	Transport		1		3					3	
	Tactical & Train	1	1		2					4	
	Technical		1		1				6	8	
	Miscellaneous										
	Total	2	8		17				6	32	
		1st Army	2nd Army	3rd Army	4th Army	5th Army	C. In C.	Q.M.G	M.G.T.C.	Total	Total %
Summary	Organisation & Policy		1		2					3	2.44%
	Personnel	1		1	4					6	4.88%
	Establishments	4	9		7	2				22	17.89%
	Equipment	3	3	1	12				2	21	17.07%
	Transport	2	3	1	3	2			3	13	10.57%
	Tactical & Train	1	5	11	5	3			3	27	21.95%
	Technical		5	1	2	1	5	1	7	22	17.89%
	Miscellaneous	2	3		2		1		1	9	7.32%
		Total	13	29	15	37	8	6	1	16	123
	Total %	10.57%	23.17%	11.79%	29.67%	6.50%	4.88%	0.81%	12.60%		100.00%

Figure 25: Agenda items by type and by source from Machine Gun conferences 1918.  
Source: G.H.Q. machine gun conferences, 1918 (B.T.M., Lindsay Papers E2004.2107, D19).  
Compiled from conferences held during 1918.

An item that Lindsay wanted to address as part of the development of the brand of the M.G.C. was advertising. In a submission for a conference in May 1918 he sought to take steps to introduce a press campaign for the M.G.C. rather like the one that had been run for the air force and tank corps. This, he thought, would help to create a sense of ‘esprit de corps’, something that (as noted before) he thought was very important.<sup>123</sup> A sample advertisement is shown in figure 26.

<sup>123</sup> G.H.Q. machine gun conferences, 14 May 1918 (B.T.M., Lindsay Papers E2004.2107.D19).

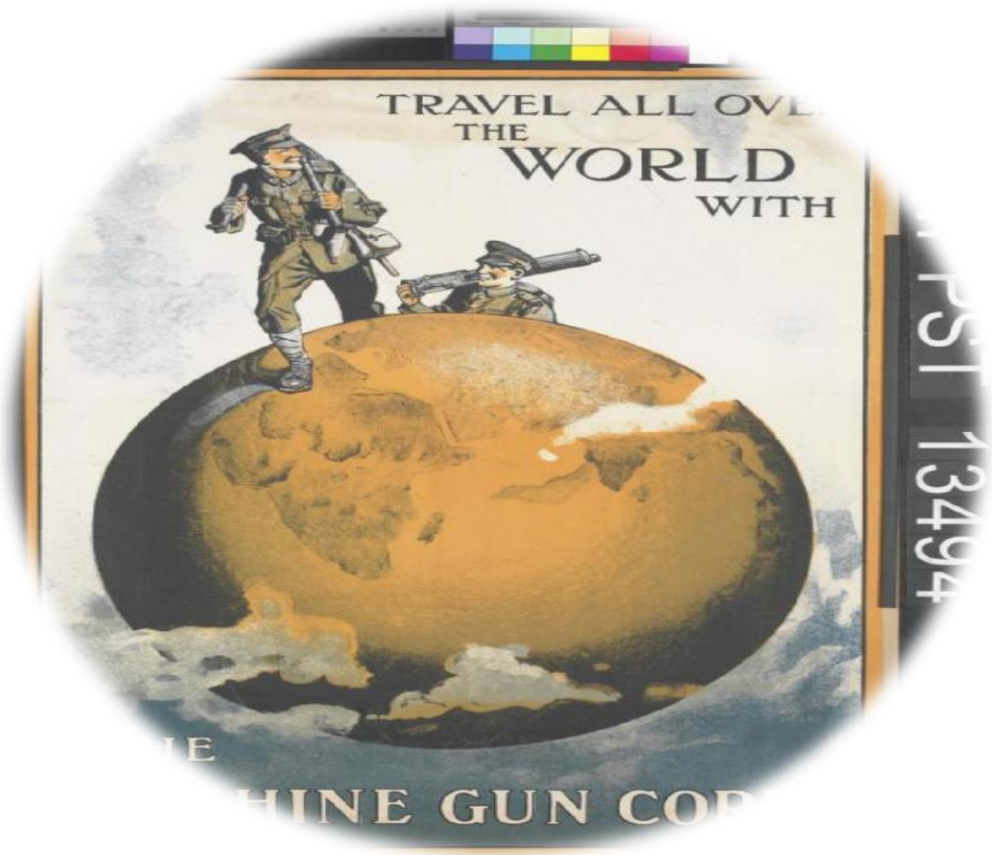


Figure 26: A recruiting poster for the Machine Gun Corps.  
Source: I.W.M., Art. I.W.M. PST 13494.

Towards the end of 1917 the Allies were facing a manpower shortage. On 21 October 1917 GHQ had issued a memorandum about the organisation and establishment of machine gun battalions. It stated ‘great diversity of opinion exists as to the conditions such an organisation should fulfil, and as to the tactical role of the machine gun in the field.’<sup>124</sup> A questionnaire which accompanied the memo posed the question ‘Would it be preferable to select men from the infantry battalions in each division to maintain the machine gun companies of the division, replacing them in battalions by ordinary infantry drafts?’<sup>125</sup> There were discussions at the War Office aimed at reducing the number of machine guns per division from sixty-four to forty-eight, in order to save men for allocation to infantry battalions. This was resisted by Lindsay, who pointed out that it was the volume of firepower created that was important and therefore the M.G.C. should be reorganised immediately into

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<sup>124</sup> Hutchinson, *Machine guns*, p. 264.

<sup>125</sup> *Ibid.*

separate machine gun battalions. He wrote to General Bonham-Carter putting forward his case.<sup>126</sup> He started his paper by seeking to address a misconception that had arisen in some senior commanders minds namely ‘the divorce of the machine guns from the infantry’ and how he explained that could be fixed. Some of the concerns imbedded in his submission were

- (a) Machine gunners will become ignorant of infantry tactics.
- (b) The infantry will become estranged from, and lose confidence in, the machine gun.
- (c) The machine gun, if removed from the control of the Battalion or Brigade Commander, will be less prompt and effective in rendering assistance in an emergency.
- (d) The machine gun will be sluggish in the attack.
- (e) The tendency will be to concentrate all the machine guns for overhead indirect fire and to allot an insufficient number of forward (mobile or consolidation) guns to infantry brigades.
- (f) The only real divorce is the divorce from the Regiment.
- (g) In conclusion it may be said that the last “prop” to the argument that the treating of the Machine Gun Corps as a separate arm will lead to a “Divorce from the infantry”, will be completely knocked away if the conditions existing in the Canadian Corps are examined.<sup>127</sup>

Lindsay acknowledged that some of these issues might have had credence in the past but not so in late 1917, when the machine gun service was sufficiently developed to overcome these problems. He pointed out that the only divorce suffered by the infantry was the broken link with their original regiment and he believed that machine gunners needed to be fully embedded in the philosophy of the M.G.C. to be truly effective.<sup>128</sup> Lindsay in conclusion, was so full of praise for Brutinel and the organisation that he developed in the Canadian Corps that he wanted it replicated in the British Army. He emphasised that the Canadians treated the machine gun as a separate arm, organised in battalions employed by divisions under Corps direction.<sup>129</sup> Far from leading to a divorce between machine gunners and infantry, this arrangement had led to increased support and mutual confidence between them that was unsurpassed in the British Army at that time. Indeed, he contended that it was

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<sup>126</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Dec. 1917 (B.T.M., Lindsay Papers E2004.1999.C41).

<sup>127</sup> Ibid. pp 5-7.

<sup>128</sup> Ibid.

<sup>129</sup> Ibid., p. 8.

this independent organisation that led to what he called true proficiency in the recent action of the Canadians in the later stages of the battle of Passchendaele. This was his call for the establishment of separate machine gun battalions in the British Army.<sup>130</sup>



Figure 27: A corporal of the Machine Gun Corps stands at a machine gun post in a captured trench at Feuchy during the Battle of Arras, Apr. 1917.  
Source: I.W.M. (Q 5159).

The idea of separate machine gun battalions had first been mooted in 1915 by Lindsay and Baker-Carr when they proposed the establishment of a M.G.C.<sup>131</sup> Subsequent events proved to Lindsay that it was now time to push for a separate machine gun battalion. He proposed a machine gun battalion consisting of a headquarters and four machine gun companies per each division, each equipped with

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<sup>130</sup> Ibid.

<sup>131</sup> Original draft of scheme for the formation of a Machine Gun Corps, June 1915 (B.T.M., Lindsay Papers E2004.1727).

sixteen machine guns.<sup>132</sup> In command of the battalion would be a lieutenant colonel with direct control of the fourth machine gun company.<sup>133</sup> The first three companies of the division would remain with each infantry brigade retaining the status quo. At the time, the Divisional Machine Gun Officer controlled the fourth machine gun company of each division but he only held the rank of major. What Lindsay in effect was proposing that these officers would be promoted to the rank of Lieutenant Colonel. Some commentators have seen this as empire building on behalf of the M.G.C. but it was necessary to further develop the organisational capacity of the service. Lindsay also pushed for the post of Corps Machine Gun Officer with the rank of Lieutenant Colonel at each Corps headquarters.<sup>134</sup> For each of the five British armies in the field, he wanted a General Staff officer to oversee the activities of machine guns and at B.E.F. G.H.Q. he wanted a headquarters consisting of a Commander (temporary Brigadier General), a G.S.O.2, a G.S.O.3 (I), a D.A.A.G and a Staff Captain.<sup>135</sup> Lindsay believed at this stage of the war that the formation of a divisional headquarters was essential to the efficiency of the Corps. He argued that without these headquarters the Corps

Wants can never be properly attended to or its interests considered, the necessary collation of information at consequent necessary in tactical methods will always be delayed as at present, new tactical methods will not be investigated and controlled from the outset as they should be, and there will be the same delay that there has always been in the past in adapting the work and training of the Corps as a whole to meet new conditions.<sup>136</sup>

In making his case for increased resources, he drew comparison with the artillery which he stated had proper support experts in the field. He explained that as machine gunnery was getting more complicated, it needed technically qualified officers to control its correct use.<sup>137</sup> Lindsay argued that the mere appointment of a Staff Officer at G.H.Q. would be useless, unless he had proper control of resources and a direct line command. This had occurred with the original appointment of C.M.G.O. in late

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<sup>132</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Dec. 1917 (B.T.M., Lindsay Papers E2004.1999.C41),

<sup>133</sup> *Ibid.*

<sup>134</sup> *Ibid.*

<sup>135</sup> *Ibid.*, p. 11. Paddy Griffith saw the development of the Machine Gun Corps as a form of empire making on behalf of George Lindsay – see Griffith, *Battle tactics of the Western Front*, p. 127.

<sup>136</sup> *Ibid.*, p. 11.

<sup>137</sup> *Ibid.*



1916 when there were no D.M.G.O.s in place. The C.M.G.O. therefore had no status: he belonged to no recognised branch of the service, and he had no intermediate connecting links with the machine gun companies he was supposed to influence.<sup>138</sup> Lindsay was concerned that time was running out before the Germans were in position to attack with troops released from the Eastern Front and he urged all to make a decision quickly.

Lindsay's views were shaped by recent battle experience at Cambrai November 1917. The Battle of Cambrai was initially a success for the British Army and for the first time in the war, church bells were rung in England. However, victory quickly turned to defeat and within a short space of time all gains were reversed.<sup>139</sup> A court of enquiry was held under the chairmanship of Lieutenant General A. Hamilton Gordon, commanding officer of IX Corps. In his submission to the enquiry Lieutenant General Sir Ivor Maxse stated that the reasons for the success of the German counter attack were twofold, namely

1. Lack of battle training in the infantry.
2. Lack of battle training and discipline in the Machine Gun Corps.<sup>140</sup>

In the rest of his submission Maxse did not expand on his thoughts about the M.G.C. but he did note that the Germans were not held up in any way by machine gun nests behind the British lines. These thoughts had been articulated before by Major Wright of the Machine Gun Guards when he commented on the divorce between the infantry and machine gunners. Because the troops were no longer part of the same unit, cooperation between them became less steady and reliable.<sup>141</sup> This was exactly what Lindsay was attempting to correct. The establishment of machine gun battalions in early 1918 was a direct result of Cambrai. The memorandum by Haig dated 10 February 1918 setting out the reasons for this change stated the following:

The fighting in the last two years had disclosed certain faults in the present organisation which militates against the efficiency and *esprit de corps* of this

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<sup>138</sup> Ibid., p. 12.

<sup>139</sup> Keegan, *The First World War*, p. 395-97.

<sup>140</sup> Cambrai – note by a member of the Court of enquiry (T.N.A., 1918, W.O., 158/53).

<sup>141</sup> Wright, 'Machine gun tactics & organization', p. 303

service (Machine Gun Corps), and it is clear that, if the full advantage is to be taken of the experience gained as to the tactical handling of machine guns in the field, it will be necessary to introduce an organisation whereby the full power of machine guns can be developed and their *esprit de corps* increased. The present organisation fails in the following respects: The guns in a division are organised in four separate self contained units without a directing head. The result is diversity of opinion and method and lack of uniformity. This organisation is too rigid and does not meet tactical requirements either in attack or defence. The formation of battalions renders the organisation flexible. The enhanced importance of machine guns, especially in defence, and the necessity of adopting an organisation which will permit full power being obtained from the machine guns is so urgent that I hope these proposals will be accepted forthwith. <sup>142</sup>

Lindsay was finally getting his way and a footnote to the reorganisation was that he was appointed to the General Staff of the First Army with the rank of Colonel. <sup>143</sup> Another officer who had called for the establishment of separate machine gun companies was Major Wright of the Machine Gun Guards. According to Wright, the following advantages would accrue for the machine gun battalion

1. The possibility of distributing tasks more evenly among the four companies.
2. A more economical use of machine guns and personnel. The whole machine gun resources of a division being in the hands of one central authority, it was possible to allocate the exact number of guns required for each task.
3. Simplification of reliefs.
4. Better control over the training of the machine gunners of a division to ensure their efficiency and stricter discipline.
5. A fairer distribution of promotion and appointments among the companies. Hitherto both brigade staffs and also the D.M.G.O. had been able to express views about promotions, and this had caused friction.
6. An improvement in the supply of machine gun spare parts and specialities.
7. Economy in the use of employed men, farriers, tailors, shoemakers etc. <sup>144</sup>

One disadvantage of the reorganisation was dual control over the same troops by the D.M.G.O. and the brigade commander, but according to Wright this was overcome in practice. Another major disadvantage was the severing of the link between the infantry and the machine gunners. The liaison between the officers became more strained and

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<sup>142</sup> Hutchinson, *Machine Guns*, p. 263.

<sup>143</sup> Criticism of revised proof of S.S.192 and review of whole machine gun subject, Feb. 1918 (B.T.M., Lindsay Papers E2004.1999.C41), p. 8. Apparently he was one of four officers deemed suitable for the appointment, the others being Hewitt, Charteris and Clarke.

<sup>144</sup> Wright, 'Machine gun tactics & organization', p. 310.

formal. This had the effect of delaying commands, which at the start of the war had travelled quicker as the links had been less formal.<sup>145</sup>

General Sir Henry Horne in a directive to his Corps Commanders in May 1918 discussed the establishment of machine gun battalions and highlighted ‘the organization of the Machine Gun Corps into battalions has proved even more successful than was anticipated’ noting that ‘the discipline, training, standard of interior economy, the general fighting efficiency of Machine Gun Units has increased enormously since the re-organisation, and the work of the Corps during the recent fighting has been of the highest order.’<sup>146</sup> Horne pointed out that ‘the organisation is still young and requires every help from Commanders of all arms to enable it to develop its full efficiency in the shortest possible time.’<sup>147</sup> He believed that ‘any assistance given will be amply repaid in future operations,’ and directed his Corps commanders to give ‘their personal attention to the system of training, employment and interior economy of Divisional Machine Gun Battalions, so as to get full value from a fighting organisation which has already proved its worth.’<sup>148</sup> According to Robbins, Horne also championed the idea that reserves of machine guns should be established at corps and army level.<sup>149</sup>

With the pending manpower shortage in the British Army in early 1918, Lindsay and the M.G.C. were called upon to develop defence in depth. The final decision to establish machine gun battalions in January 1918 was a milestone. There was still a lot of work to be done to make the new structure ready for combat. Time was not on the side of the Allies. A directive was issued by G.H.Q. advertising the change in February 1918, but it was not implemented evenly across the whole army. The Third and Fifth Armies were slow in training machine gun battalions, a point noted by G.S. Hutchinson.<sup>150</sup> While the new battalions came into being, the tactical handling of machine guns was ignored. In the Third and Fifth Armies no effective machine gun barrage scheme was developed; not enough time and resources were devoted to the proper positioning of machine gun posts, and insufficient enough ammunition was

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<sup>145</sup> Ibid.

<sup>146</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* (Farnham, Ashgate, 2010), p. 290. (Hereafter Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919*). This directive was sent to I, XI, XVII, XVIII and Canadian Corps.

<sup>147</sup> Ibid.

<sup>148</sup> Ibid.

<sup>149</sup> Ibid.

<sup>150</sup> Hutchinson, *Machine guns*, p. 265.

transported to the machine guns.<sup>151</sup> Hutchinson was critical of the fact that no instructions were given to the infantry to act as escorts for the machine gunners, the consequences of which were in his opinion disastrous.<sup>152</sup>



Figure 28: Gunners of the Machine Gun Corps filling their gun with water at Graincourt, 24 Nov. 1917.

Source: I.W.M. (Q 6317).

On 21 March 1918, the Germans launched their Spring Offensive or *Kaiserschlacht* (Kaiser's Battle) against the British Third and Fifth Armies.<sup>153</sup> Initially the Germans overran the front lines and broke through using new infiltration tactics of stormtroopers. These were heavily armed mobile troops who would infiltrate the British lines and bypass strong points. These were left to the infantry following behind. The British defence lines were weak and had not been laid out properly. While in theory there was supposed to be three defence lines, due to a lack of troops they were not adequately

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<sup>151</sup> Ibid.

<sup>152</sup> Ibid. p. 265.

<sup>153</sup> Zabecki, 'Operational art and the German 1918 offensives' p. 228.

manned. Machine guns were used extensively as part of this defence, but suffered from the recent split from the infantry. It was evident that machine guns on their own could not hold back the new German tactics, as they found themselves under attack from all sides.<sup>154</sup>

In preparation for the attack, the Germans augmented the attacking divisions with specialist units that transformed them into a combined arms organisation that according to David Zabecki made them look like a modern divisional structure. Engineer companies, telephone and radio detachments, medical collecting companies, ammunition trains, subsistence trains, and road repair and labour companies were attached to each division.<sup>155</sup> The German offensive opened with the largest artillery bombardment in history of that time. The Germans fired 3.2 million rounds on the first day of the battle. Nearly one third of that total consisted of gas shells of which Yellow Cross inflicted 12,000 Allied casualties.<sup>156</sup> By the end of the first day of the battle, the Germans had captured as much territory as the Allies had needed 140 days to wrest from the Germans in 1916.<sup>157</sup> The Germans were aided by the weather as the foggy conditions allowed the gas to be more effective.<sup>158</sup> The battle lasted for sixteen days in which the Germans penetrated the Allied lines to a depth of sixty kilometres, capturing over 1,200 square miles of territory. The Germans also detained 90,000 Allied prisoners, 1,300 guns, and created a major rift between the British and the French armies. The British Fifth Army had been almost totally destroyed, and the B.E.F. was on the brink of falling back on its channel ports. The casualties on both sides were severe. The Germans suffered fewer casualties but had less capacity to replace them for the rest of the war.<sup>159</sup> Tactically the battle was a success but strategically it was a failure and Zabecki lays the blame on Ludendorff who he believed concentrated on the tactical level of warfare, at the expense of the operational and strategic levels.<sup>160</sup> However, Zabecki believes that Ludendorff was a product of the institution he grew up in. The Germany Army and its General Staff

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<sup>154</sup> Crutchley, *Machine gunner, 1914-1918*, iii, pp 131-35.

<sup>155</sup> Zabecki, 'Operational art and the German 1918 offensives' p. 228.

<sup>156</sup> *Ibid.*, p. 243.

<sup>157</sup> *Ibid.*, p. 277.

<sup>158</sup> *Ibid.*, p. 243

<sup>159</sup> *Ibid.*, p. 280. The Germans suffered 239,800 casualties whereas the Allies incurred 254,739.

<sup>160</sup> *Ibid.*, p. 279.

had a tendency to ignore the strategic level of war, and their understanding of the operational level was deeply flawed, more resembling tactics on a very large scale.<sup>161</sup>

The fighting of the Spring Offensive was very confusing and some of the records show just how much pressure the machine guns were under. Various battle reports of the time comment on similar problems affecting the machine gun companies.<sup>162</sup> The difficulties of transport, of moving ammunition up to the front, of units retreating with no support from the infantry and of bad communications were all reported.<sup>163</sup> Hutchinson laid the blame for this chaos at the feet of the Fifth Army commander, General Sir Hubert Gough. According to Hutchinson, if Gough had

co-ordinated his machine gun defence, well supplied with ammunition and positioned in concrete, and, further had he issued incontrovertible orders that machine guns were to be regarded as the frame work of defence, the machine guns “to be defended at all costs”, then no disorderly retirement would have been the sequel even of his precipitate order to retreat.<sup>164</sup>

With the March battles over there was a frantic move to develop defence in depth. Lindsay wrote a paper on the subject entitled ‘The siting of machine gun positions in connection with emergency defensive lines’ in April 1918.<sup>165</sup> This was after the first phase of the Kaiserschlacht and took into account lessons learned by the Fifth Army. The paper was necessary due to the unforeseen nature of the German assaults. The Allies were now fighting from new, hastily prepared positions which posed new problems. Lindsay set out the principles on which the new tactics would rest. The emergency line would be situated behind the existing lines through which the Germans would have to fight.<sup>166</sup> There would be no labour or time to build deep dugouts for the machine guns.<sup>167</sup> However, he noted that the Germans would probably have advanced too far in front of their protective heavy artillery and they would not be aware of these new emergency lines. Therefore, principles set down in SS192 would no longer apply as they were premised on a fixed trench system with

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<sup>161</sup> Ibid.

<sup>162</sup> Crutchley, *Machine gunner, 1914-1918*, iii, pp 131-35.

<sup>163</sup> Hutchinson, *Machine guns*, pp 268-70.

<sup>164</sup> Ibid., p. 263.

<sup>165</sup> The siting of machine gun positions in connection with emergency defensive lines, 18 Apr. 1918 (B.T.M., Lindsay Papers E2004.2066.D5).

<sup>166</sup> Ibid.

<sup>167</sup> Ibid.

predetermined ranges and so on.<sup>168</sup> Lindsay set out the objects that should be borne in mind when siting the guns

- (a) To strike the enemy with an intense volume of direct fire at the earliest possible moment.
- (b) To simplify the taking up of their positions by the machine gun units.
- (c) To sight the positions with a view to GROUND and not TRENCH LINES, so that the machine guns may be able to cover the ground on which the enemy is likely to present the best targets and thus to use the KILLING EFFECT of machine gun fire to the best advantage.<sup>169</sup>

Realising that resources were limited, he wanted machine guns to be used to the best advantage and only to cover the main attack routes.<sup>170</sup> Noting that the Germans in recent attacks had used valleys to cover their attacks, he wanted special attention paid to covering ground between spurs. Other less obvious targets would be covered by the infantry. He addressed the paper to the B.G.G.S of the First Army and finished by stressing that a difference now existed as the battle on the Western Front was changing from 'warfare of highly organised defence to that of improvised defence.'<sup>171</sup> His article was accepted and sent to all the Corps of the First Army with the orders to implement it fully straight away.<sup>172</sup> In the same article he stated that he wanted to amend SS192 with the new tactics. Lindsay was always praising his troops to any new audience and claimed that the recent fighting had shown the extraordinarily fine work of the M.G.C. He claimed that more reliance was being placed on the Corps at a time when resources were getting scarcer and wanted this addressed. He also stressed that the new machine gun battalion was having a positive effect in developing an esprit de corps by reinforcing the feeling in the Corps that they were now part of a separate arm of the service.<sup>173</sup>

This new defence system was shown to good effect in April 1918 at Meteren during the battle of the Lys in April where the 33<sup>rd</sup> Machine Gun Battalion under the command of Lieutenant Colonel G.S. Hutchinson held a three-mile front against the attacks of several German divisions for six days.<sup>174</sup> This action was recorded in the

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<sup>168</sup> Ibid.

<sup>169</sup> Ibid.

<sup>170</sup> Ibid.

<sup>171</sup> Ibid.

<sup>172</sup> Ibid.

<sup>173</sup> Ibid.

<sup>174</sup> War diary, 33<sup>rd</sup> Machine Gun Battalion, 12-19 April 1918 (T.N.A., W.O., 95/2417/2).

*Official history of the War* as a fine example of a defensive action by the M.G.C.<sup>175</sup> The Official History recorded the actions of the 33<sup>rd</sup> Machine Gun Battalion during the action at Meteren. It noted how the infantry line was established by the skilful use of the machine guns under the command of Lieutenant Colonel G.S. Hutchinson.<sup>176</sup> Hutchinson completed a report for Major General Pinney, G.O.C. 33<sup>rd</sup> Division, after the battle and wrote

The experiences gained by this Division in the recent operations around Meteren and Bailleul leave no shadow of doubt that the machine gun battalion organisation was adopted only just in time. From our previous experiences I do not think, for one moment, that the task performed by the machine guns could possibly have been done under the old organisation. I could go further than this, and say definitely that the enemy could not have been held except by machine guns trained and organised as a battalion, under one control and with one centralised source of ammunition supply: feeding with reserve personnel and replacement of damaged equipment.<sup>177</sup>

He concluded his report with the words ‘there is no doubt whatever that had not the 33<sup>rd</sup> Division been present in Meteren early on the morning of the 12<sup>th</sup> and actively alert with its reconnaissance and outposts, the gap which existed on a three mile front, roughly between Bailleul and Merris would have been penetrated; and that the enemy, who showed such an extraordinary rapid advance and activity, would have seized Mont De Cats by the evening of the 12<sup>th</sup>.’<sup>178</sup> The after action report of the 100<sup>th</sup> Infantry Brigade noted the role of the machine gunners in stopping the German attacks especially the 6<sup>th</sup> Company Motor Machine Gun Battery.<sup>179</sup> For this action at Meteren the 33<sup>rd</sup> Machine Gun Battalion received a special mention in the divisional record and the Official History noted ‘it was the resolute handling of its machine-gun battalion which contributed most to holding the Germans back from Meteren.’<sup>180</sup> After the battle, Major General Pinney received a telegram from Field Marshal Sir Douglas Haig thanking him and the men of the 33<sup>rd</sup> Division ‘for the splendid fight

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<sup>175</sup> Hutchinson, *Machine guns*, pp 235-60.

<sup>176</sup> James E, Edmonds, *History of the Great War based on official documents, Military operations France and Belgium 1918, March-April: Continuation of the German Offensives* (London, 1937) pp. 270-2.

<sup>177</sup> War diary, 33<sup>rd</sup> Machine Gun Battalion, 12-19 April 1918 (T.N.A., W.O., 95/2417/2).

<sup>178</sup> *Ibid.*

<sup>179</sup> War diary, 100<sup>th</sup> Infantry Brigade, 10-18 April 1918 (T.N.A., W.O., 95/2429/3).

<sup>180</sup> James E, Edmonds, *History of the Great War based on official documents, Military operations France and Belgium 1918, March-April: Continuation of the German Offensives* (London, 1937) p. 272.



made by troops of their Division'.<sup>181</sup> Hutchinson gives a vivid and colourful account of this defensive battle in his memoirs *Machine guns: their history and tactical development (being also a history of the Machine Gun Corps, 1916-1922)*.<sup>182</sup>

Apparently after the war in 1932 Hutchinson, who became a fascist, was travelling in Germany when he met members of the German Alpine Corps, who had fought in the action at Meteren. The Germans recounted how 'the barrage was impenetrable day after day: the direct fire annihilating, the losses terrific.'<sup>183</sup> They thought that they were facing troops from a machine gun school the fire was so good. Praise indeed from an enemy!

Captain Wimberley was acting D.M.G.O. of the 51<sup>st</sup> (Highland) Division from January 1918, and recounted his experience of trying to prepare defence in depth

When I got to Division I found that rumours of a great Boche offensive for the spring were coming in to Headquarters every day, and in consequence "Uncle" was ordering a strengthening of the line everywhere. From the M. G. point of view we wanted deep dug-outs for every gun, so that the team might stand the bombardment, and in consequence all M. G. Companies in the Division, with the technical help of the R. E.'s got busy. Hardie was very keen on guns being grouped in pairs and near the infantry. This was undoubtedly sound. Grantham [Machine Gun School], looking at it purely theoretically, advocated guns away from the infantry and the recognised trench line, in order to escape the enemy's artillery fire. But what was gained by this disposal of the guns was more than lost by the weakening of the teams' morale.<sup>184</sup>

Wimberley further explained that within the 51<sup>st</sup> (Highland) Division the machine gunners were expected to cooperate alongside the infantry. However, Wimberley also commented that the corps co-ordination was less than effective when it came to machine gun positions throughout the corps sector<sup>185</sup>

I rode over to a place, Vaulx, west of Morchies, and there met the B.G.G.S., by name Brigadier General De Pree, the Corps M. G. O., a Major Westrop, the D.M.G.O. of the division on our left, by name Deane-Drummond, and the

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<sup>181</sup> War diary, 100<sup>th</sup> Infantry Brigade, 10-18 April 1918 (T.N.A., W.O., 95/2429/3).

<sup>182</sup> Ibid.

<sup>183</sup> Letters from and leaflet by Lieutenant Colonel Graham Seton Hutchinson, 16 July 1932 (B.T.M., Lindsay Papers E2004.2956.13).

<sup>184</sup> French, 'The 51<sup>st</sup> (Highland) Division during the First World War' p. 299.

<sup>185</sup> Ibid., The 51<sup>st</sup> (Highland) division was part of IV Corps.

other D.M.G.O., whose name I have forgotten. We had a most argumentative day. De Pree was, in my opinion, an idiot about M. G. 's - there is no other word for him - he had no idea of placing guns at all, and did not know how to set about it. Weston was sound according to his lights, but very keen on the battery system of 6 and 8 guns, which I thought too many eggs in one basket. Deane-Drummond was frankly bored, he was a typical Munster Fusilier, and I believe very gallant in action. However, we all agreed that De Pree was all wrong, and, together, dissuaded him from the positions he usually chose.<sup>186</sup>

Wimberley noted that while the C.M.G.O. Major Westrop was actually correct in allocating six to eight guns, his authority was insufficient to ensure uniformity in the corps. Wimberley was at that time a firm believer of never grouping more than two guns together, as he considered that was sufficient fire-power to stop an attack.<sup>187</sup> However, he revised his opinion to the Grantham standard after the launch of the Kaiserschlacht stating 'that two guns together were not enough on the 21 March, but until I personally saw it, I never would have believed that the Boche could attack in such dense formations.'<sup>188</sup>

Dennis Williams notes the important role that machine guns played in the latter campaign of 1918. For an attack by the 28<sup>th</sup> Division on 28 September 1918, the divisional record noted 'The creeping barrage was good and the indirect [machine gun] barrage was excellent.'<sup>189</sup>

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<sup>186</sup> Ibid.

<sup>187</sup> Ibid.

<sup>188</sup> Ibid.

<sup>189</sup> Dennis, Williams, 'British Second Army and coalition warfare in Flanders in the Hundred Days, 1918' (PhD thesis, University of Birmingham, 2015) p. 179.

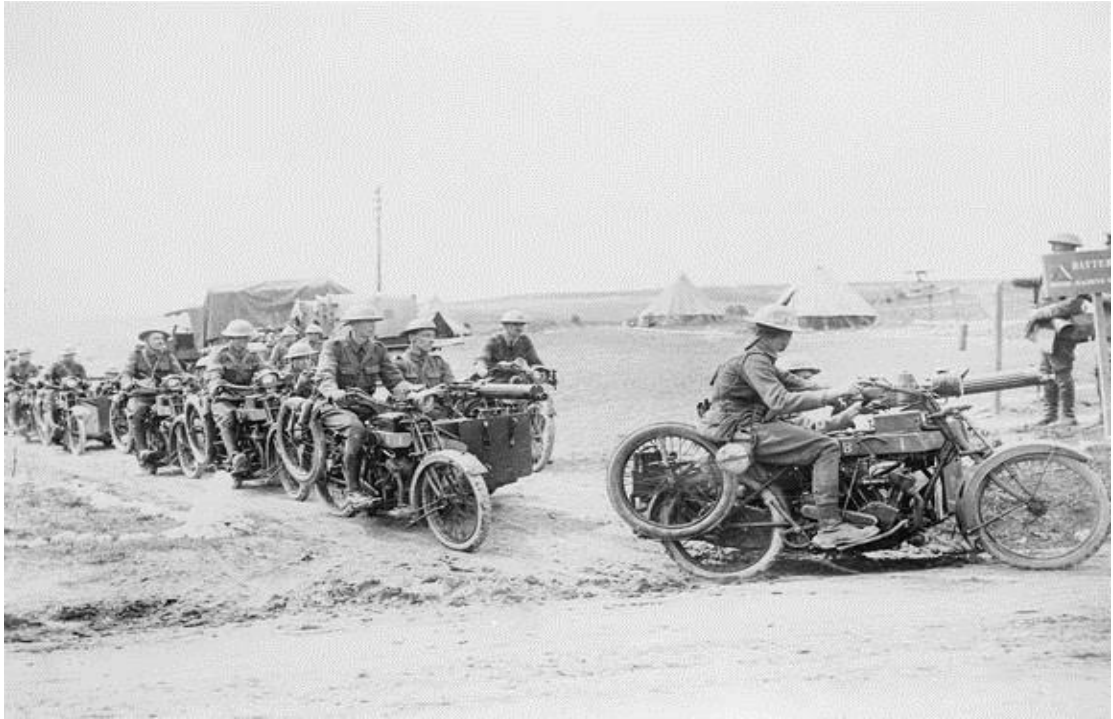


Figure 29: Motor company of the Machine Gun Corps leaving camp South West of Albert–Amiens road, Nov. 1916.  
Source: I.W.M. (Q 4404).

General Horne, G.O.C. First Army, became interested in defence in depth after the start of Kaiserschlacht and based his ideas around the premise of ‘well organised machine gun defences in depth with as many machine guns as possible sited to fire direct supported by a well organised artillery and machine gun barrage, in front of the forward system.’<sup>190</sup> Learning from the experience of the Fifth Army in March 1918, Horne ordered the 56<sup>th</sup> Division who initially had strongly garrisoned the forward trenches to pull back to the battle zone. This according to Robbins saved many casualties when the Germans attacked during the Lys Offensive of April 1918.<sup>191</sup>

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<sup>190</sup> Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* p. 193.

<sup>191</sup> *Ibid.*

## MOTOR MACHINE GUN UNITS

With the expansion of the Army in autumn 1914 the War office generated a plan to create a motor machine gun battery for each infantry division in the British Army. By February 1915 this plan had evolved to the extent that two motor machine gun batteries had been sent to the B.E.F. in January and another eight were expected to follow in February.<sup>192</sup> Each battery consisted of eighteen motor cycle/sidecar combinations, carrying six Vickers machine guns with ammunition and spare equipment, eight motorcycles without sidecars, six box bodied motor cars, and a sidecar combination for the officer commanding. The staff compliment was a major or captain commanding, three subalterns, six NCOs, fifty two other ranks.<sup>193</sup> These batteries were meant to provide mobile fire power but with the advent of static warfare their use became redundant. *The Times* did note their invaluable service in an operation for the battle for Hill 60 around Ypres on the 18 April 1915, when they were rushed to the front and helped repel a German counter attack.<sup>194</sup> The Motor Machine Gun Batteries remained in France as unattached troops until finally they were incorporated into the Machine Gun Corps as mobile troops. They formed part of the Heavy section of the Machine Gun Corps who were the first to be equipped with tanks.<sup>195</sup>

Lindsay always had an interest in the capability of mobile machine gun units, whether equipped with motor cycles or armoured cars, but his ideas really came to a head in 1918 no doubt influenced by Brutinel and his mobile units. In May 1916 he wrote to Major General Burnett Stuart at GHQ stating that ‘an autonomous massed machine gun force was necessary as a motorised instrument of breakout.’<sup>196</sup> In April 1918 he was stating ‘that to meet modern conditions cavalry should have been transformed into motor machine gun batteries, using motor transport in place of

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<sup>192</sup> Motor Machine Gun Batteries, Apr. 1915 (T.N.A., 1915, W.O., 158/288).

<sup>193</sup> Ibid.

<sup>194</sup> *The Times*, 23 Apr. 1915.

<sup>195</sup> The long, long trail the British Army in the Great War of 1914-1918 , motor machine guns of the First World War <http://www.longlongtrail.co.uk/army/regiments-and-corps/machine-gun-corps-in-the-first-world-war/motor-machine-guns-of-the-first-world-war/> (2 March 2017).

<sup>196</sup> Griffith, *Battle tactics of the Western Front*, p. 127.

horses.<sup>197</sup> Lindsay acted as the C.M.G.O. of the IV Corps for the Battle of Cambrai and realised from the resultant failure to capitalise on the initial breakout that some sort of mobile units were required. With this in mind he gave a series of lectures to officers of the Canadian Corps and I Corps on the employment of machine guns in open and semi-open warfare.<sup>198</sup> Tanks were fine for the breakthrough but a lighter vehicle was required to continue the battle. Whippet tanks were developed by the British and Renault FT17s were developed by the French for this role but were not readily available in large enough numbers to carry out this role. The British still had the elements of motor cycle units available and Lindsay turned to their use. There was a mobile machine gun force available since May 1918, when the units of the Household Cavalry were converted into mobile machine gun units.<sup>199</sup>

During the summer of 1918 Lindsay who was D.I.M.G.U. of the First Army started to develop definite proposals for mobile warfare.<sup>200</sup> By July 1918 the Allies were ready to go over to the offensive against the Germans. With this in mind the First Army started to develop mobile machine gun units. Unlike the Canadian Motor Machine Gun Brigade where there were no armoured cars or trucks available and as a result the units were based around motor cycles. The machine guns could be fired from the bikes or used dismounted.<sup>201</sup>

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<sup>197</sup> Letter from George Lindsay to Jackson, Charteris and Hewitt, Apr. 1918 (B.T.M., Lindsay Papers E2004.2058.D3).

<sup>198</sup> War diary, Machine Gun Officer Canadian Corps, Dec. 1917 (L.A.C. Canadian Great War Project).

<sup>199</sup> Cuthbert Headlam, *History of the Guards Division in the Great War, 1915-1918* (2 vols., London, 1924), ii, 315. A royal warrant was issued on 10 May 1918 converting the 1<sup>st</sup> Life Guards, into a motor machine gun battalion of the Guards Machine Gun Regiment.

<sup>200</sup> Record of Lindsay's Brigade: 27<sup>th</sup> Aug. 1918 to 5<sup>th</sup> Sept. 1918, 26 Aug. 1918. (B.T.M., Lindsay Papers E2004.2368.E1).

<sup>201</sup> [http://www.criticalpast.com/video/65675024089\\_Battle-of-Arras\\_motor-machine-gun-section-moves\\_gunned-soldiers-on-each-motorbike\\_World-War-I](http://www.criticalpast.com/video/65675024089_Battle-of-Arras_motor-machine-gun-section-moves_gunned-soldiers-on-each-motorbike_World-War-I) for film clip of a Motor machine gun section receiving final instructions and leaves for position during Battle of Arras.



Figure 30: General Sir Henry Horne, the Commander of the First Army, inspecting the 24th Motor Machine Gun Battalion at Dieval, 12 June 1918. The motorbikes are Clyno 744 cc twin cylinder machines fitted with a sidecar and Vickers machine-guns  
Source: IWM (Q10325).



Figure 31: General Sir Henry Horne, the Commander of the First Army, inspecting the 24th Motor Machine Gun Battalion at Dieval, 12 June 1918.  
Source: I.W.M. (Q 10325).



Figure 32: Motor company of the Machine Gun Corps at practice. The motors are left in a sunken road, while the soldiers dash up the bank with the guns, South West of Albert–Amiens road, Nov. 1916.  
Source: I.W.M. (Q 4401).

During August 1918, in preparation for the Battle of Arras, General Horne authorised the establishment of a composite brigade consisting of a brigade headquarters, 18<sup>th</sup> Corps Cyclists, 3<sup>rd</sup> Royal Horse Guards Battalion, and the 1<sup>st</sup> Life Guards Battalion.<sup>202</sup> The brigade contained sixty-four machine guns, eight armoured cars and had 300 cyclist infantry. It was commanded by Lindsay and named after him as Lindsay's Brigade.<sup>203</sup> The operation order outlined the 'nature of the operations [which] are likely to be such as to necessitate rapid moves prohibiting the issue of written detailed order. It is, therefore of the utmost importance that all ranks are fully acquainted with their probably duties and with the maps of the ground likely to be covered in the

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<sup>202</sup> See [http://www.criticalpast.com/video/65675027543\\_soldiers\\_motor-machine-guns-batteries\\_trees-asides-a-street\\_soldiers-fire](http://www.criticalpast.com/video/65675027543_soldiers_motor-machine-guns-batteries_trees-asides-a-street_soldiers-fire) for film clip of motor machine gun battery. See [http://www.criticalpast.com/video/65675027525\\_British-officers\\_pass-on-vehicles\\_soldiers-on-motor-bikes\\_soldiers-on-horses](http://www.criticalpast.com/video/65675027525_British-officers_pass-on-vehicles_soldiers-on-motor-bikes_soldiers-on-horses) for film clip of the 17th (Armoured Car) Battalion with Autocars of the C.M.M.G.B. around Amiens during August 1918.

<sup>203</sup> Because it had no regular comparator within the army structure it was called after its commanding officer. The Canadians did the same with Brutinel and his armoured force.

operations.<sup>204</sup> The force was formed to support the Cavalry Corps and was created very quickly. Indeed, it seems to have been formed on the day of battle. There was no time to train as a unit or in collaboration with other units. A mobile infantry brigade was established as well. It consisted of three infantry battalions, a Stokes Mortar battalion, four 18-pounders and two 4.5 howitzers. This force had over 150 lorries to provide transport to its more than 2,646 troops.<sup>205</sup> There was also an armoured car battalion allotted to the Cavalry Corps equipped with Peerless armoured cars. Within a day signal troops were added to provide proper communications. Lindsay's Brigade remained in the Corps reserve and did not see any action in the second Battle of Arras which lasted from 26 August to 3 September 1918. At the end of the battle the 1<sup>st</sup> Life Guards Machine Gun Battalion, the 3<sup>rd</sup> Royal Horse Guards Machine Gun Battalion and the 18<sup>th</sup> Cyclist Battalion was formed into the Household Machine Gun Brigade and Lindsay's Brigade ceased to exist.<sup>206</sup>

Lindsay wrote a paper for G.H.Q. in September 1918 setting out his thoughts on mobile machine gun units.<sup>207</sup> The paper was based on his own recent experiences leading Lindsay's Brigade and the experience of Brutinel's Independent Force. He started by stating that his recent experience had convinced him of the value of mobile fire power forces in the role of break-through. The principal function of such forces would be to push on in front of the infantry once the latter have succeeded in breaking through the front lines and

- a) Seize tactical points and deny them to the enemy.
- b) Seize points on the enemy communications, rail and road, and thus disorganise his arrangements for reinforcement.
- c) Seize ground to the front, on if possible a wider than the original break-through and thus:-
  - i) Project the Cavalry units while the latter pass through the gap
  - ii) Allow the greater freedom of manoeuvre immediately after they have passed through the gap
  - iii) After the Cavalry have passed through them, to act in their support, and by taking over points of tactical importance seized by the cavalry, allow the latter greater liberty of action.
- d) To act generally in conjunction with Tanks, Aircraft, etc., in the exploitation of success.<sup>208</sup>

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<sup>204</sup> Record of Lindsay's Brigade: 27th Aug. 1918 to 5th Sept. 1918, 26 Aug. 1918. (B.T.M., Lindsay Papers E2004.2368.E1).

<sup>205</sup> Ibid.

<sup>206</sup> Ibid.

<sup>207</sup> Ibid.

<sup>208</sup> Formation of mobile Machine Gun Brigade, 20 Sept. 1918 (B.T.M., Lindsay Papers E2004.2369.E2).



In order to achieve this type of tactical success Lindsay set out the requirements of such a force:

- a) Be a self-contained fighting unit, containing such a proportion of the various arms, that it is capable of independent action.
- b) Be trained as a fighting unit for some months before it is employed, first by itself, and later in conjunction with the other arms,
- c) Have the 'Esprit de Corps' of its own, and consist of very highly trained personnel.
- d) Have all the components parts imbued with that mutual confidence which can only be attained by a considerable period of association and training.<sup>209</sup>

In terms of troops, Lindsay wanted the force to consist of a brigade headquarters with signal troops, two machine gun battalions with motor transport, each battalion to consist of 4 x 8 gun batteries and eight armoured cars, a cyclist battalion and a trench mortar battery.<sup>210</sup> The machine gun battalions would be smaller than what was in situ but this reduction in personnel would allow the armoured cars to be driven by Machine Gun Corps troops. In order to secure the proposal agreement on Lindsay was willing to contain the size of the unit. By reducing the number of guns per battalion and using the troops to man and support the armoured cars he believed a more flexible and mobile force would be created.<sup>211</sup>

According to Lindsay there were five motor machine gun battalions available at the time; this would allow two brigades to be formed straight away. Apparently the Canadian Corps – meaning Brutinel – was in agreement and were looking to form their own force.<sup>212</sup> Along similar lines Brutinel wanted to collaborate in the formation, training and equipping of this British unit.<sup>213</sup> The Canadians already had two motorised brigades available and were using them in the battles of the 100 Days Offensive. This paper was merely an outline for the General Staff to consider in order to agree the general principles. Operationally it would be spring of 1919 before these brigades could be ready for action. Key to this development was the availability of reliable armoured cars and Lindsay informed G.H.Q. that General Brutinel had sourced a French

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<sup>209</sup> Ibid.

<sup>210</sup> Ibid.

<sup>211</sup> Ibid.

<sup>212</sup> Ibid.

<sup>213</sup> Ibid. There were three motor machine gun battalions of the Household Cavalry and two yeomanry battalions.

manufacturer who was supplying 250 to 300 vehicles to the French Army. Lindsay believed that a formal request to the French authorities would secure any number of cars required by the British.<sup>214</sup> He received a reply the following day to the effect that the War Office would enquire about the armoured cars with the French.<sup>215</sup> His proposals to reorganise the motor machine gun battalions was accepted but the formation of composite brigades was rejected at this time. Brigadier General Lucas decided that the five motor machine gun battalions would be reorganised and allocated to five Corps.<sup>216</sup> Then when they were required to act as a mobile force they would have cyclists, cavalry, mortars, and so on attached to them.<sup>217</sup> Lindsay was not happy with the decision as he believed it missed the whole point of the composite force. Unless the force trained as a unit and established an esprit de corps, it could not operate independently.<sup>218</sup> He was convinced that a permanent force was required and he pointed out that a commander would not learn himself if he could not have a unit to train. Brigade headquarters needed to train to work together with the different components and this could only be done with a permanent structure. He wrote to complain to General Lucas about the decision.<sup>219</sup>

Lindsay was supported in his views by General Horne who endorsed his proposals verbatim. For the fighting around Arras in September 1918 the Cavalry Corps was placed under his command. To strengthen the firepower of the cavalry Horne established Lindsay's Brigade as an attached force. In the end Lindsay's Brigade was not deployed in the battle but Horne was impressed with its potential capability and urged the force's official adoption. He wrote to G.H.Q. saying

I feel convinced that forces of this nature will be very valuable when we get to more open fighting; their principal role being to push on rapidly in front of the infantry as soon as the latter have succeeded in breaking through the enemy's defences, and their action generally being in the nature formerly laid down for mounted infantry as modified by the introduction of tanks, aircraft and armoured cars.<sup>220</sup>

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<sup>214</sup> Formation of mobile Machine Gun Brigade, 20 Sept. 1918 (B.T.M., Lindsay Papers E2004.2369.E2).

<sup>215</sup> Ibid.

<sup>216</sup> Brigadier General Cuthbert Lucas, inspector of Machine Gun units claim to fame was that he was captured by the I.R.A. in 1920 while fishing in the river Blackwater in County Cork. Released after a month he said he had been treated honourably, "as a soldier, by soldiers".

<sup>217</sup> Formation of mobile Machine Gun Brigade, 20 Sept. 1918 (B.T.M., Lindsay Papers E2004.2369.E2).

<sup>218</sup> Ibid.

<sup>219</sup> Ibid.

<sup>220</sup> Ibid.

Horne also pointed to the success of the Canadians in developing and using forces of this type. Horne wanted this force established and trained to be ready for operations in Spring 1919.<sup>221</sup>

Militarily Lindsay's Brigade had no effect on the outcome of the war, but the formation of the unit demonstrated the thought processes of both Lindsay and Horne who was willing to listen. This was one of the first mechanised forces in the British Army in the sense that it attempted to establish an independent 'combined arms' force.<sup>222</sup> Lindsay understood that providing motor transport to machine guns would not work on its own, that the force multiplier would only be achieved by developing a force that would contain several different arms. He believed that Lucas and the General Staff had missed that point when they merely wanted to attach mobile machine guns to corps. The force needed to be trained to work together and trust each other and understand their strengths and weaknesses. The Canadians had proved that when they spend time training during the Summer of 1918. The Canadians were far in advance of the British and Germans when they developed mobile independent brigades. Indeed, the Germans never developed breakout units like the C.M.M.G.B. and suffered as a result. During the Kaiserschlacht the Germans became bogged down in the Allied defensive systems and could not move traditional infantry and artillery forward sufficiently quickly to exploit the initial success. A motorised unit could have helped in this regard; although it would have encountered difficulty traversing the cratered terrain. Writing in 1927, when he was the Inspector of Royal Tank Corps, Lindsay identified these embryonic mobile machine gun units as the forerunner of mechanised brigades that the army were then attempting to develop.<sup>223</sup> Lindsay noted that by the middle of 1918 the British and Canadian Armies had eleven motorised machine gun units equipped with 632 Vickers machine guns.<sup>224</sup> This was more machine guns than the B.E.F. had at the start of the war and they were

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<sup>221</sup> Ibid.

<sup>222</sup> Griffith, *Battle tactics on the Western Front* p. 161, A cavalry battlegroup was formed at High Wood in July 1916 which contained field engineers with bridges, two armoured cars, a machine gun squadron and a field artillery battery. This unit was built around cavalry whereas Brutinel's unit was based around the machine gunners as core troops. Kenyon, 'British cavalry on the Western Front 1916-1918', p. 105. On the 26 March 1917, The 9<sup>th</sup> Light Armoured Car Battery was attached to the 2<sup>nd</sup> Indian Cavalry Division with six Rolls Royce armoured cars. This force named 'Ward's Force' after its commander, attacked Roisel as part of the Battle of Arras. The armoured car attack was successful but the cavalry struggled in the marshy ground. This is one of the first recorded instances of combined armoured car and cavalry cooperation.

<sup>223</sup> Notes of employment of motorised Machine Gun squadrons, Apr. 1927 (B.T.M., Lindsay Papers E2004.2685. E22).

<sup>224</sup> Ibid.

motorised. It is not realised the extent of such forces available to the British Army by the end of 1918 as they were not fully utilised in battle apart from the Canadians.

#### POST-WAR EXPERIENCE

Lindsay attended and passed the Staff College at Camberley in 1921 and was posted to Iraq in June 1921.<sup>225</sup> He was placed in command of an armoured car unit which was part of the Royal Tank Corps.<sup>226</sup> Armoured cars were ideal for imperial policing in countries such as Iraq. While there, he carried out experiments in the use of mechanized forces in tandem with aircraft, keeping the force supplied by aircraft. When he left Iraq his armoured car unit was transferred to the R.A.F. who also developed armoured car units of their own and had taken over the sole control of policing of the country. According to J.P Harris, Lindsay developed his concept of an 'entirely mechanical force' while in Iraq.<sup>227</sup> This ultimately led to the establishment of an experimental mechanical force on Salisbury Plain in 1927-28.

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<sup>225</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>226</sup> Ibid.

<sup>227</sup> J.P. Harris, *Men, ideas and tanks: British military thought and armoured forces, 1903-1939* (Manchester, 1995), p. 197 (hereafter Harris, *Men, ideas & tanks*).



Figure 33: Fifth Battle of Ypres. Troops of the 36th Battalion, Machine Gun Corps passing French armoured cars drawn up by the side of the Menin Road Hooze, 29 Sept. 1918. Source: I.W.M. (Q 11800).

Lindsay returned to England in 1923 and became chief instructor of the R.T.C. based in Bovington and nearby Lulworth.<sup>228</sup> In 1926 he was appointed Inspector R.T.C. a planning post in the War Office.<sup>229</sup> This role allowed him to develop his ideas of combined mechanised forces. He wanted to establish a force based around the tank in combination with other forces and working in close cooperation with aircraft. Lindsay became interested by the possibilities of armoured, mechanised mobility and came to believe that it could transform warfare. This had evolved from his time with Lindsay's Force, his experience in Iraq and from the influence of Brutinel. J.P. Harris described him as the strongest individual influence on the development of British military thought on armoured forces and armoured warfare from the early 1920s up to 1934.<sup>230</sup> Other officers had come to the fore in the development of the tank during this period, J. F. C. Fuller, who had been one of the leading officers in the Tank Corps and helped to plan the tank attack at the Battle of Cambrai in November 1917. Fuller was promoting ideas for a smaller fully

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<sup>228</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>229</sup> Ibid.

<sup>230</sup> Harris, *Men, ideas & tanks* p.198.

mechanised army that would save resources and reduce casualties.<sup>231</sup> Unfortunately, Fuller was an unconventional character who found it rather difficult to work well with others. Lindsay, on the other hand, was widely liked by his fellow officers and enjoyed much better relations with his superiors.<sup>232</sup> Percy Hobart, Charles Broad and Frederick Pile were other officers who played a role in the post-war development of the R.T.C. and Basil Liddell Hart was a journalist who had some influence on tank development.<sup>233</sup>

Lindsay's experimental force was approved by the Chief of the Imperial General Staff, Sir George Milne, who declared 'I consider Colonel Lindsay's ideas are very sound.'<sup>234</sup> Originally known as the Experimental Mechanical Force, the unit held exercises on Salisbury Plain in 1927 and 1928 which attracted international military attention and are still seen as a turning point in the development of mechanised warfare.<sup>235</sup> Some of Lindsay's ideas were published in staff pamphlets in 1929 and 1931.

Lindsay was posted to Egypt as a brigadier on the General Staff from 1929 to 1932.<sup>236</sup> He returned to England to take command of the 7<sup>th</sup> Infantry Brigade, a motorized brigade based at Tidworth. His early ideas had been solely based around the tank with little support troops, but now he wanted to establish a more balanced armoured division as an all arms mechanised force. In 1934 he was given command of a rudimentary, improvised armoured division for an exercise held on Salisbury Plain.<sup>237</sup> This was to be his crowning glory. However, the exercise did not go according to plan. The exercise was extremely difficult to perform and Lindsay was not helped with his personal situation. His wife was suffering some health problems and this left him 'unable to concentrate on or take real interest in anything and feeling that he was not pulling [his] weight .... or doing really good work'<sup>238</sup>. Also his relationship with Percy Hobart, the commander of his tank brigade had broken

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<sup>231</sup> Ibid., pp 203-05.5

<sup>232</sup> Ibid.

<sup>233</sup> Ibid., pp 248-50.

<sup>234</sup> Ibid., p. 198.

<sup>235</sup> Ibid., p. 219. Both the German and American armies sent military attaches to observe the trials. The Germans wrote about their observations but were banned from having any armoured forces under the Treaty of Versailles.

<sup>236</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>237</sup> Ibid.

<sup>238</sup> Harris, *Men, ideas & tanks*, p. 250.

down. Originally agreeing on similar ideas about armoured warfare, they had now started to disagree on the composition of armoured forces.<sup>239</sup> Hobart wanted tank only formations whereas Lindsay wanted to develop 'all arms' formations. Hobart did not take the exercise seriously and at one stage stopped cooperating with Lindsay leading to Lindsay's mobile force being defeated. Liddell Hart described the result of the exercise as 'a frame up' and thought that it set back the development of armoured forces in the British Army, but the modern view is that it had no effect on the General Staff.<sup>240</sup>

The exercise was a disaster for Lindsay and his career in the R.T.C. was effectively finished. He was publically criticised by Major General Burnett-Stuart, the exercise director, an experience that he found deeply humiliating.<sup>241</sup> He was deemed to have failed as a commander of field forces yet his value as a military thinker and organiser was undiminished. At the time Lindsay's ideas for the organisation of mechanised forces was far ahead of anyone else in the British Army, including Hobart's, but he was tarnished. In 1935 he was promoted to Major General and posted to Calcutta as commander of the presidency and Assam district.<sup>242</sup> He remained there until he retired in 1939. His idea for a mobile division was taken up by Montgomery-Massingberd, Chief of the Imperial General Staff, and established in 1937. Montgomery-Massingberd apparently wanted Lindsay to command this unit but he retired himself before he could get this organised.<sup>243</sup> On the outbreak of the Second World War Lindsay was given command of the 9<sup>th</sup> Highland Division. In 1940 he was appointed deputy regional commissioner for civil defence in the South-West of England.<sup>244</sup> In 1944 he was appointed Commissioner for the British Red Cross and Order of St John in North-West Europe overseeing relief work during the liberation of France and the Low Countries.<sup>245</sup>

Lindsay played a key role in developing machine gun doctrine for the British Army during the First World War. He helped to establish the M.G.C. and played a

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<sup>239</sup> Ibid.

<sup>240</sup> Ibid., p. 251.

<sup>241</sup> Ibid., p. 253.

<sup>242</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>243</sup> Harris, *Men, ideas & tanks*, p. 253.

<sup>244</sup> Lindsay Papers (K.C.L., Liddell Hart Centre for Military Archives, Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12)

<sup>245</sup> Ibid.

significant part in founding the Machine Gun School in Grantham and the Small Arms School in Camiers. Throughout his career he worked tirelessly to create new doctrine in conjunction with the Canadian officer, Brutinel. Their collaboration was an example of horizontal innovation at work and they achieved some notable successes such as barrage fire and machine gun battalions. During his career he was constantly developing proposals for submission to senior commanders. In 1918 he was appointed the senior machine gunner in the First Army which allowed him greater scope to develop his ideas. Towards the end of the war he developed new innovative methods of mobile warfare which during the inter-war period would germinate into armoured warfare. While successful in some instances he had to overcome opposition to continually push his ideas.



## CHAPTER FOUR: R. V. K. APPLIN'S USE OF MACHINE GUN BARRAGE AT THE BATTLE OF MESSINES AND LEADING THE BRITISH MACHINE GUN MISSION TO THE US

When that demonstration was over, there was not a General there, however prejudiced he may have been before, that was not convinced of one thing, and that was that he himself under no circumstances would have dashed across that space. R.V.K. Applin <sup>1</sup>

### APPLIN AND THE BATTLE OF MESSINES

The first major use of barrage fire by the British Army as part of a major offensive was at the Battle of Messines in 1917. Building on innovative ideas of barrage fire as practiced by the Canadian Corps at the Battle of Vimy Ridge in April 1917, R.V.K. Applin, adopted these tactics for the II ANZAC with great success. Applin had trialled an early form of indirect barrage fire in South Africa in 1904 and now had over 250 machine guns to put it into practice.<sup>2</sup> Following on from the successes at Vimy Ridge and Messines, Field Marshal Haig ordered all future attacks to take account of this new innovative tactic.<sup>3</sup> After the battle of Messines Applin was sent on a training mission to America in a form of transnational military innovation as described by Theo Farrell.<sup>4</sup>

The main testimony for the action of machine guns in the II ANZAC during the Battle of Messines is a lecture delivered by R.V.K. Applin in America in November 1917.<sup>5</sup> This lecture, delivered to American officers as part of the British Machine Gun Mission to America commanded by Applin, was printed and issued as official British machine gun doctrine in *Machine gun notes, no. 2 (from British sources)*. In total 11,527 copies of this publication were produced and issued in

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<sup>1</sup> R.V.K. Applin, 'Lecture on the machine guns at the Battle of Messines' in *Machine gun notes, no. 2 (from British sources)* (Washington, 1918), pp. 34-35. Hereafter referred to as Applin, 'Lecture on the machine guns at the Battle of Messines.' Applin was referring to the demonstration of barrage fire that he attended with senior generals on the sands at Camiers in August 1917.

<sup>2</sup> Applin, *Across the seven seas*, p. 223.

<sup>3</sup> J.H. Boraston (ed.), Sir Douglas Haig; despatch of 25 December 1917, p. 140

<sup>4</sup> Adam Grissom, 'The future of military innovation studies' in *Journal of Strategic Studies*, xxix, no. 5 (Oct. 2006), p. 917.

<sup>5</sup> Applin 'Lecture on the machine guns at the Battle of Messines.'

America to the A.E.F.<sup>6</sup> Applin's claims and assertions in the lectures were backed up by evidence in the official war diaries of the units involved. The role of C.M.G.O. was in Applin's own words 'to advise, and finally, under instruction from my Corps Commander to issue orders for the use of machine guns in battle.'<sup>7</sup> The operation order of X Corps for the Battle of Messines noted the role of C.M.G.O. He was to 'assist Divisions in the instruction of the personnel employed in the barrage. He would out any additional instruction he could at Corps Headquarters, and Divisions would provide facilities for the attendance of personnel.'<sup>8</sup> The II ANZAC instruction for the plan of attack on Messines, dated 29 May 1917, noted that 'the C.M.G.O. will co-ordinate the action of Divisional machine guns employed for barrage work.'<sup>9</sup> The war diaries of units record his role as the senior machine gun officer operating in the II ANZAC. As C.M.G.O. he had no executive powers but his role is clearly visible in training the machine gunners, organising machine gun conferences, in allocating the guns for the machine gun barrage, and in designing the pattern for the machine gun barrage. The after action reports all acknowledge the role of the machine guns in the overall victory. C.E. Crutchley credits Applin with organising the machine gun fire at the Battle of Messines in his book *Machine gunner 1914-1918: personal experiences of the machine gun corps*.<sup>10</sup>

Figure 34 shows a summary of machine gun barrages fired in 1916 and 1917 up to the Battle of Messines. These early machine gun barrages were merely standing barrages, fired on fixed points by the machine guns of a single brigade or division under the control of a D.M.G.O. They were one-off incidences but nonetheless they were of significance in the development of machine gun doctrine as they sowed the seed for further development because it was only when the machine gunners adopted artillery equipment and techniques that machine gun barrages became fully developed. As can be seen from Figure 34 the first proper machine gun barrage was fired by the Canadians at Vimy Ridge.<sup>11</sup> R.V.K. Applin recounted how in early 1917 he observed the machine gun

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<sup>6</sup> *United States Army in the world war, 1917-1919, general orders, GHQ, AEF* (vol. 12-15, Washington, 1988), xiv, p. 330-32.

<sup>7</sup> Applin 'Lecture on the machine guns at the Battle of Messines', p. 48.

<sup>8</sup> Lessons learnt [sic.] from Messines – Wytchaete operations – machine guns, 1917 (T.N.A., W.O., 158/298 Appendix VI).

<sup>9</sup> War diary II, ANZAC, General Staff, Mar. 1916 -Dec. 1917 (T.N.A., W.O., 95/1033/3, p. 11).

<sup>10</sup> Crutchley, *Machine gunner, 1914-1918*, iii, 93.

<sup>11</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug.-Sept. 1915 (L.A.C., Canadian Great War Project).

preparations for the Battle of Arras. He described how it was performed by ‘one of our crack machine gun officers’<sup>12</sup> and viewed it as a further development of an action that had been performed on the Somme.<sup>13</sup> It was a barrage on a small scale and he maintained that it could only be performed by lifts of 200 yards at a time.<sup>14</sup> Lieutenant Colonel R. G. Clarke, C.M.G.O. of XV, devised this barrage and used forty-eight machine guns from 4<sup>th</sup> Division to support an infantry attack on Bouchavesnes on 18 February 1917.<sup>15</sup> The war diaries of the 5<sup>th</sup> and 6<sup>th</sup> Machine Gun Companies record that a barrage of thirty-eight guns was fired on 29 April 1917 to support an attack by the 2<sup>nd</sup> Division at the Battle of Arleux which was part of the Arras Offensive.<sup>16</sup> During the second Battle of the Scarpe on 23 April 1917, the 33<sup>rd</sup> Division fired a machine gun barrage using twenty-four guns.<sup>17</sup> This action was under the direction of Major G.S. Hutchinson.<sup>18</sup> Once again, it was the Canadians who led the way, with Brutinel leading a force who were the first to use machine guns for a mass barrage. As can be seen from the Figure 34, the first major use of machine guns for barrage fire was at Vimy Ridge and the second was at Messines. Paul Cornish described the machine gun action at the Battle of Messines. He noted that it was actually three barrages in one as each corps was responsible for its own barrage depending on its objectives and terrain it faced. X Corps fired four standing barrages, each 500 yards in front of their objectives while IX Corps fired a standing barrage and then a creeping barrage in line with their advance.<sup>19</sup> According to Cornish ‘the most refined plan was devised by none other than Colonel Applin, who was the machine gun officer of II ANZAC.’<sup>20</sup> Applin established a standing barrage to protect the southern flank, an enfilade barrage was brought to bear on the rear approaches of Messines village, and a creeping barrage was fired 400 yards in front of the artillery creeping barrage.<sup>21</sup>

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<sup>12</sup> Applin is referring to Lieutenant Colonel R. G. Clarke, C.M.G.O. of XV Corps who in 1918 was appointed D.I.M.G.U. of Third Army.

<sup>13</sup> Applin is possibly referring to the action by the 100<sup>th</sup> Machine Gun Barrage on 24 Aug. 1916 at High Wood.

<sup>14</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’, p. 32.

<sup>15</sup> Hutchinson, *Machine guns*, p. 187.

<sup>16</sup> War diary, 5<sup>th</sup> Machine Gun Company, 1 Jan. 1916- Feb. 1918 (T.N.A., W.O., 95/1351/2, pp 30-33); War diary 6<sup>th</sup> Machine Gun Company, 1 Jan. 1916-31 Oct. 1917 (T.N.A., W.O., 95/1363/2, p. 97).

<sup>17</sup> G.S. Hutchinson, *History and memoir of the 33<sup>rd</sup> Battalion Machine Gun Corps and of the 19<sup>th</sup>, 98<sup>th</sup>, 100<sup>th</sup> and 248<sup>th</sup> M.G. Companies* (London, 1919), 1 Mar. 1916-28 Feb. 1918 (T.N.A., W.O., 95/2431/3) (hereafter Hutchinson, *History & memoir*).

<sup>18</sup> *Ibid.*

<sup>19</sup> Cornish, *Machine guns & the Great War*, p. 100.

<sup>20</sup> *Ibid.*, p. 100.

<sup>21</sup> *Ibid.*

Commander	Rank	Battle	Army Unit	Army Unit	Date	Number of Machine Guns
Colonel Raymond Brutinel	C.M.G.O.	Action at Messines	1st Canadian Division	Canadian Corps	23/24 September 1915	20 <sup>22</sup>
Major G.S. Hutchinson	D.M.G.O.	Action at High Wood	33rd Division	XV Corps	24 August 1916	10 <sup>23</sup>
Lieutenant Colonel R. G. Clarke	C.M.G.O.	Action at Bouchavesnes	4th Division	XV Corps	18 February 1917	48 <sup>24</sup>
Colonel Raymond Brutinel	C.M.G.O.	Battle of Vimy Ridge		Canadian Corps	09 April 1917	358 <sup>25</sup>
Major G.S. Hutchinson	D.M.G.O.	Second Battle of the Scarpe - part of the Arras Offensive	33rd Division	VII Corps	23 April 1917	24 <sup>26</sup>
Major W.G. Hewett	D.M.G.O.	Battle of Arleux- part of the Arras Offensive	2nd Division	XIII Corps	29 April 2016	38 <sup>27</sup>
Lieutenant Colonel R.V.K. Applin	C.M.G.O.	Battle of Messines	3rd Aus., 4th Aus., 25th Division, New Zealand Divisions	II ANZAC	07 June 1917	250 <sup>28</sup>
	C.M.G.O.	Battle of Messines	16th, 19th, 36th Divisions	IX Corps	07 June 1917	162 <sup>29</sup>
Lieutenant Colonel H. F. Bidder	C.M.G.O.	Battle of Messines	23rd, 24th, 41th, 47th Divisions	X Corps	07 June 1917	148 <sup>30</sup>

<sup>22</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug.-Sept. 1915 (L.A.C., Canadian Great War Project).

<sup>23</sup> Hutchinson, *Machines guns*, pp. 185-87.

<sup>24</sup> Hutchinson, *Machine guns*, p. 187.

<sup>25</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project).

<sup>26</sup> G.S. Hutchinson, *History and memoir of the 33<sup>rd</sup> Battalion Machine Gun Corps and of the 19<sup>th</sup>, 98<sup>th</sup>, 100<sup>th</sup> and 248<sup>th</sup> M.G. Companies* (London, 1919), 1 Mar. 1916-28 Feb. 1918 (T.N.A., W.O., 95/2431/3) (hereafter Hutchinson, *History & memoir*).

<sup>27</sup> War diary, 5<sup>th</sup> Machine Gun Company, 1 Jan. 1916- Feb. 1918 (T.N.A., W.O., 95/1351/2, pp 30-33); War diary 6<sup>th</sup> Machine Gun Company, 1 Jan. 1916-31 Oct. 1917 (T.N.A., W.O., 95/1363/2, p. 97).

<sup>28</sup> An ANZAC Corps conference dated 17 May 1917 allocated 250 machine guns for the operation (Australian War Memorial, RCDIG0000620, Monash Papers, book 15, 10 May-9 June 1917).

<sup>29</sup> 19<sup>th</sup> Division: Machine guns; tactical and technical lessons learnt, 1917 (T.N.A., W.O., 158/418).

<sup>30</sup> Lessons learnt [sic] from Messines – Wytshaete operations – machine guns, 1917 (T.N.A., W.O., 158/298, Appendix II).

		Battle of Messines	Total for Messines		07 June 1917	560
Lieutenant Colonel R.V.K. Applin	C.M.G.O.	Action at Warneton	3rd Australian Division	II ANZAC	31 July 1917	48 <sup>31</sup>
Lieutenant Colonel H. F. Bidder	C.M.G.O.	Battle of Menin Road - part of 3rd Ypres	33rd Division	X Corps	26 September 1917	136 <sup>32</sup>

Figure 34 Machine Gun Barrages 1916-1917

Sources: see footnote

Upon the outbreak of the war, Captain R.V.K. Applin was in India commanding the School of Musketry at Satara.<sup>33</sup> He had hoped to be transferred back to Britain or Mesopotamia to command troops but was told that he was required in India to train machine gunners. At that time he was the senior machine gun instructor on the Sub Continent.<sup>34</sup> He was disappointed to note that his fellow officers were being given field commands but he had to obey orders. While in Satara, he updated his book *Machine gun tactics* and was gratified to note that the tactical principles he had advocated in 1910 had come to pass.<sup>35</sup> Finally in autumn 1916 he was ordered back to Britain but not to a field command. Instead, he was posted to the Machine Gun Training Centre at Grantham as a tactical instructor.<sup>36</sup> He spent three months there as an instructor where his technical knowledge was put to good use. According to Applin, he was promised command of the first machine gun battalion to be formed but he lost out to a more senior officer. This is questionable as machine gun battalions were only formed in early 1918. Applin made similar claims in his autobiography, *Across the seven seas*, which casts doubt on his memory, but does not invalidate his overall claims. Applin's command experience at the front began in early 1917 when he was appointed Corps Machine Gun Officer of the II ANZAC, a part of the Second Army. This appointment was made following a brief period of time spent in the front line at Arras where he was attached to the 6<sup>th</sup> Machine Gun Company. While there, he saw the preparations for the battle of Arras and how a

<sup>31</sup> Australian War Memorial, RCDIG0000622, Monash Papers, book 16, 1 Aug.-30 Sept. 1917).

<sup>32</sup> Hutchinson, *Machines guns*, pp. 215-216.

<sup>33</sup> Applin, *Across the seven seas* p. 246.

<sup>34</sup> The Indian Army was hugely important to the British Empire during the war. Over one million Indian troops served overseas in Europe, Africa and the Middle East of whom 62,000 died and another 67,000 were wounded.

<sup>35</sup> Applin, *Machine gun tactics*, p. v. Applin completed this work in July 1915.

<sup>36</sup> Applin, *Across the seven seas* p 252.

machine gun barrage was deployed.<sup>37</sup> The post of Corps Machine Gun Officer was the most senior machine gun officer in the army at that time and Applin had over 250 machine guns of four divisions (3<sup>rd</sup> Australian Division, 4<sup>th</sup> Australian Division, 25<sup>th</sup> Division, and the New Zealand Division) under his direction.<sup>38</sup> Applin's appointment to the II ANZAC coincided with the plan to attack the Messines Ridge in June 1917. As part of the planning for the battle he developed some new ideas on the use of machine gun barrages.

The Battle of Messines was planned to take place in early June 1917 and was aimed at capturing the German defences on the Messines Ridge which commanded the high ground south of Ypres. The capture of Messines was to be the opening phase of a major British offensive of 1917.<sup>39</sup> The goal of the offensive was to advance to Passchendaele Ridge, then capture the Belgian coast up to the Dutch frontier. The Allies had been stuck in front of Messines since 1914 and had long-term plans to capture the heights. Since 1916, mines had been tunnelled under the ridge and the explosion of these was to start the assault.<sup>40</sup> The Second Army, using three corps, II ANZAC, IX Corps and X Corps, under General Sir Herbert Plumer was to lead the assault.<sup>41</sup>

On taking up his appointment in March 1917, Applin met with the Second Army Commander, General Plumer and outlined his thoughts on barrage fire.<sup>42</sup> Plumer was completely taken with this new idea and arranged for Applin to visit the Canadian machine gun officer Lieutenant Colonel Raymond Brutinel.<sup>43</sup> Plumer had just issued instructions noting 'that machine gun barrages were of very good value and should be developed further.'<sup>44</sup> Brutinel had used barrage fire successfully against the Germans at Vimy Ridge in April 1917. The success of the Canadians at Vimy Ridge was noted by the rest of the British Army. Christopher Pugsley has highlighted how a special relationship developed between the Canadians and the troops of the Anzac forces after the Battle of

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<sup>37</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 32.

<sup>38</sup> (Australian War Memorial, RCDIG0000620, Monash Papers, book 15, 10 May-9 June 1917). An ANZAC Corps conference dated 17 May 1917 allocated 246 machine guns for the operation

<sup>39</sup> Keegan, *The First World War* pp. 381-82.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

<sup>42</sup> War diary II, ANZAC, General Staff, Mar. 1916- Dec. 1917 (T.N.A., W.O., 95/1032/1, p. 99). The Corps war diary noted that Applin took up his appointment on 3 Mar. 1917.

<sup>43</sup> Applin, *Across the seven seas*, p. 258.

<sup>44</sup> Notes on recent operations carried out by the First and Third Armies, 26 Apr. 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917). The directive was signed by Major General C.H. Harington, Chief of Staff 2nd Army.

Vimy Ridge. The Canadians were more experienced than the Anzac troops on the Western Front, having arrived in France a year earlier in 1915. This lack of experience on the part of the Anzac troops was noted by their commanders and they turned to the Canadians who had a similar Dominion background. For the preparation of the Battle of Messines the II ANZAC utilised the new platoon organisation which had been successful for the Canadians at Vimy Ridge.<sup>45</sup> There was a constant transfer of ideas from the Canadians to the Anzacs. It was in that context that Applin was dispatched to view the work of Brutinel.<sup>46</sup>

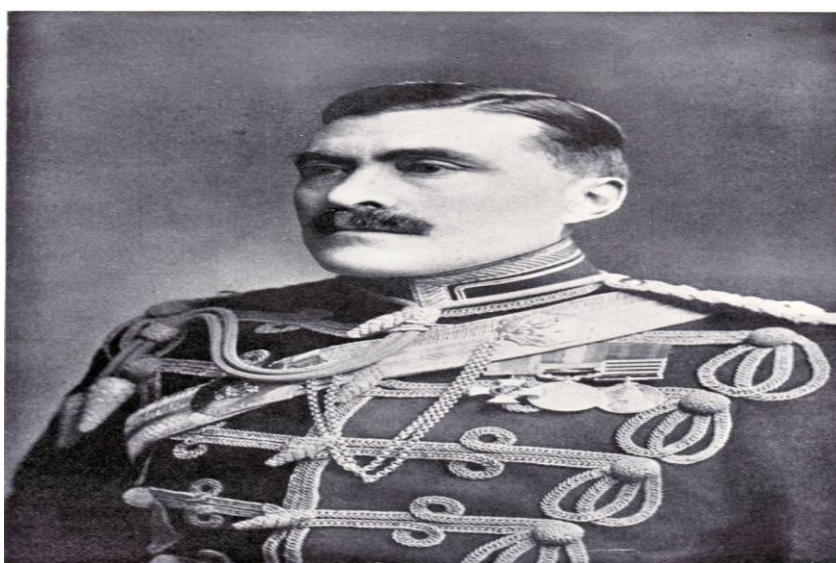


Figure 35: Colonel R.V.K. Applin, D.S.O., O.B.E.  
Source: Applin, *Across the seven seas*.

Applin asked specially to meet Brutinel at Vimy Ridge. This was a seminal encounter as it was the meeting of two of the most influential machine gun officers of the war. Applin as detailed elsewhere in the thesis was an influential author of pre-war machine gun doctrine. Indeed, some Canadian writers have identified him as an influence on Brutinel.<sup>47</sup> However, while Applin in his memoirs acknowledges Brutinel's advice he

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<sup>45</sup> Pugsley, *The ANZAC experience*, p. 191.

<sup>46</sup> Monash Papers, book 15, 1 Apr.-10 May 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917). The file notes that several papers were passed from the Canadians to the 3<sup>rd</sup> Australian Division on intelligence, on the recent actions by the First Army and on 'lessons learned' by the Canadian Divisions at the Battle of Vimy Ridge.

<sup>47</sup> Yves Tremblay, 'Brutinel: A unique kind of leadership' in Bernd Horn and Stephen John Harris (eds), *Warrior chiefs: perspectives on senior Canadian military leaders* (Canada, 2001), p. 62 (hereafter Tremblay, 'Brutinel: A unique kind of leadership'). Yves Tremblay states that Brutinel got his ideas about the use of overhead fire from the reading of Applin's book *Machine gun tactics*.

never suggested that Brutinel had taken his ideas. At the time of their meeting, Brutinel had more war time experience on the Western Front and Applin acknowledged that experience. This was in line with what Pugsley contends, that the Canadians were teaching the Anzacs forces at this time.<sup>48</sup> Applin goes on to describe Brutinel at the Battle of Vimy Ridge as ‘perhaps one of the greatest machine gunners today.’<sup>49</sup> This interaction between these two officers at this time intimates that Brutinel did not see Applin as the source of his ideas. Applin at this meeting is the pupil and not the master as some authors have asserted.<sup>50</sup> Brutinel and his Canadian force were recognised after the Battle of Vimy Ridge as having achieved something different. Brutinel noted his role in imparting knowledge about machine gun barrages to the wider British army after the Battle of Vimy Ridge. He hosted over eighteen visits to his headquarters by Corps Machine Gun Officers to learn about these new tactics.<sup>51</sup>

Lieutenant Colonel H.F Bidder, C.M.G.O. of X Corps credited the Canadians with the idea of barrage fire for the Battle of Messines.<sup>52</sup> Andrew Simpson maintains that the role of the C.M.G.O. during the Battle of Messines was given more to do than usual because of this help from the Canadian Corps.<sup>53</sup> ‘After action reports’ on machine guns were passed from the Canadians to II ANZAC as part of a learning process during this period. Notes from the 4<sup>th</sup> Canadian Division confirmed what Brutinel told Applin, that the machine gun barrage was 150 yards in front of the artillery, that 75% of the machine guns were allotted for the creeping barrage and 25% were allowed go forward with the infantry. The report also noted that machine guns should only move forward when the consolidation is going well.<sup>54</sup> Another report noted that ‘machine gun barrages proved of

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<sup>48</sup> Pugsley, *The ANZAC experience*, p. 191.

<sup>49</sup> Applin ‘Lecture on the machine guns at the Battle of Messines’, p. 32. There are other references included in this thesis which demonstrates the high opinion that Brutinel was held in by officers in the British Army. Lindsay describes Brutinel ‘as probably the greatest living authority on machine guns matters of all kind.’ See correspondence and text regarding Lectures in England and the controversy about them, 3 Mar. 1919 (B.T.M., Lindsay Papers E2004.2743).

<sup>50</sup> Cornish, *Machine guns & the Great War*, p. 99. Cornish comments on this meeting of Brutinel and Applin and quite clearly understands that Applin learned from Brutinel.

<sup>51</sup> Letter from Brutinel on employment of M.G.’s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E2004.1995.C37).

<sup>52</sup> Lessons learnt [sic] from Messines – Wytshaete operations – machine guns, 1917 (T.N.A., W.O., 158/298).

<sup>53</sup> Andrew, Simpson, ‘The operational role of British corps command on the Western Front, 1914-18’ (PhD thesis, University College, London, 2001)p. 106. (Hereafter Simpson, ‘The operational role of British corps command on the Western Front, 1914-18’)

<sup>54</sup> Notes from the 4<sup>th</sup> Canadian Division, 8 May 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917).



very good value and could have been developed more'.<sup>55</sup> This notion that machine guns had performed well but could be improved upon was seized upon by Applin.

After the Battle of Vimy Ridge, Brutinel played host to Allied officers, seeking his advice on modern machine gun tactics. Applin is the only one among these officers who has left a record of his meeting with Brutinel and the impact it had on his own ideas. He arrived on the day after the capture of Vimy Ridge and inspected the battlefield with Brutinel.<sup>56</sup> He was able to witness at first hand the effect of barrage fire which was a vindication for both their ideas. Applin was determined to use barrage fire at Messines in all its different forms.<sup>57</sup> He also took on board the concept of an S.O.S. barrage. This was used to provide protective fire over the heads of the infantry when they were consolidating their positions in the newly captured trenches and to beat back any counter attacks. Brutinel explained the potential of the S.O.S. barrage to Applin and emphasised that everything should be done to get the machine guns into positions to achieve this.<sup>58</sup>

Applin spent three days with the Canadians and learned as much as possible on the delivery of barrage fire. He was particularly impressed with the success of barrage fire and saw an opportunity to fine tune it further. The Germans had started to shelter their troops in switch and reserve trenches, away from the front line, in order to avoid the British artillery. When the heavy artillery had passed over and before the light artillery started a barrage on the trenches, the Germans would rush out of their dugouts and fire on the advancing British infantry. That inflicted huge casualties on the British infantry. The Canadians, under Brutinel at Vimy Ridge, fired a machine gun barrage in between the heavy and light artillery and this time caught the Germans unawares.<sup>59</sup> Applin was determined to use this tactic at Messines.

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<sup>55</sup> Notes on recent operations carried out by the First and Third Armies, 26 Apr. 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917).

<sup>56</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 32.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid., , p. 33.

<sup>59</sup> Ibid., p. 32.

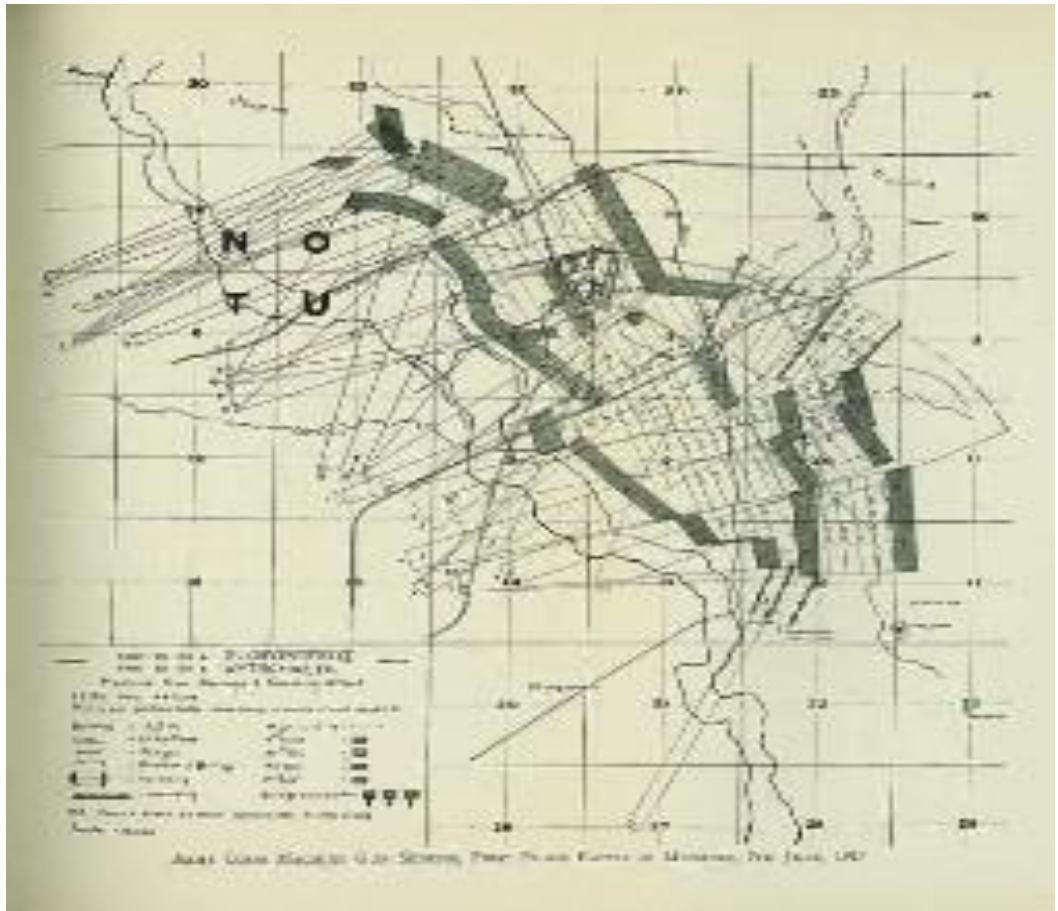


Figure 36: Machine gun barrage plan at the Battle of Messines 1917 developed by Colonel R.V.K. Applin.

Source: Luxford, *With the machine gunners in France & Palestine*.

Applin reckoned he would have between 250 to 300 machine guns available for the attack and less than two months to prepare.<sup>60</sup> When asked by his corps commander, General Sir Alexander Godley, what the machine guns would be used for at Messines, he replied ‘Sir, I propose that we shall do a barrage, a creeping barrage in front of our infantry from the moment they leave the trench until they occupy the position’.<sup>61</sup> In order to achieve this barrage, Applin set about training and equipping his troops. Applin held a conference of all the machine gun officers of II ANZAC on 8 April 1917 at Corps HQ to discuss the upcoming offensive.<sup>62</sup> The machine gun companies were taken out of the trenches and sent for special training behind the lines. The training involved both physical

<sup>60</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’, p. 36. An ANZAC Corps conference dated 17 May 1917 allocated 246 machine guns for the operation (Australian War Memorial, RCDIG0000620, Monash Papers, book 15, 10 May-9 June 1917).

<sup>61</sup> *Ibid.*

<sup>62</sup> War diary, 75<sup>th</sup> Machine Gun Company, Mar. 1916-Feb. 1918 (T.N.A., W.O., 95/2251/5, p. 64).

exercise and technical instruction for all the gun crews on mock-ups of the battle site. The war diaries of the ANZAC noted the training regime that Applin put in place.

The 10<sup>th</sup> Australian Machine Company diary recorded how the sections were shown a large relief map of the territory to be attacked and special positions and features explained to them.<sup>63</sup> The war diary of the 74<sup>th</sup> Machine Gun Company noted on 2 June 1917 that Colonel Applin C.M.G.O. gave a lecture to all the men and officers of the company where they were shown a model of Messines Ridge.<sup>64</sup> It also noted a visit by Applin on 8 March 1917 during which he carried out an inspection.<sup>65</sup> He returned to the 7<sup>th</sup> Machine Gun Company on 28 May 1917 to give a lecture on indirect fire to all the officers of the company.<sup>66</sup> He then procured sufficient spare gun barrels and clinometers for the guns. He had to bargain hard for scarce resources which often only arrived the day before the battle was due to commence. Applin found that the most difficult part of the plan was to position his guns correctly. He allocated 144 guns to the creeping barrage to cover a front of three thousand yards.<sup>67</sup> Some of the positions he chose were already allocated to the artillery and he had to haggle to secure them. He subdivided his machine gun companies into groups of eight guns and allocated them positions. Again he faced arguments from brigade commanders who wanted to keep all their machine guns under their own control. Reluctantly, he allowed four guns per brigade to accompany the infantry in their follow-up attack.<sup>68</sup> The operation plan for the attack noted this and allowed at least eight guns per brigade to remain under the control of the Divisional commanders.<sup>69</sup>

Applin found that concealing the machine guns from the enemy was a difficult task. As part of their training, the gunners learned to dig and conceal a new type of slit trench at night which could conceal the gun. The trench was roughly five foot deep by eight foot long, protected against shrapnel and camouflaged. The camouflage was regularly changed as the grass grew around the trenches.<sup>70</sup> According to Applin only ten guns were destroyed by German artillery during the battle, a testimony to how well the

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<sup>63</sup> War diary, 10<sup>th</sup> Machine Gun Company, A.I.F., June 1917 (Australian War Memorial, AWM4, 24/15/9).

<sup>64</sup> War diary, 74<sup>th</sup> Machine Gun Company, Mar. 1916-Feb. 1918 (T.N.A., W.O., 95/2247/6, p. 49).

<sup>65</sup> War diary, 7<sup>th</sup> Machine Gun Company, Jan. 1916-Feb. 1918 (T.N.A., W.O., 95/2244/6, p. 79).

<sup>66</sup> *Ibid.*, p. 98.

<sup>67</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 40

<sup>68</sup> *Ibid.*, .

<sup>69</sup> War diary II, ANZAC, General Staff, Mar. 1916-Dec. 1917 (T.N.A., W.O., 95/1033/3, p. 11).

<sup>70</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 40

guns were hidden.<sup>71</sup> When Applin was appointed C.M.G.O. in March 1917, he circulated a document to the troops under his command entitled 'Extracts from a report on machine gun barrage fire employed on the Somme'.<sup>72</sup> The report recommended that in order for a barrage to be effective, good communications was necessary, sufficient ammunition should be supplied on request, and carrying parties should be allocated to transport ammunition and water to the forward guns.<sup>73</sup> At the start of the planning process for the offensive, a Corps order placed the machine gun companies of the reserve division (4th Australian) at Applin's disposal.<sup>74</sup> However, he had no authority to issue orders for these guns and could only make recommendations as to their use. The II ANZAC instruction for the plan of attack on Messines, dated 29 May 1917, noted that 'the C.M.G.O. (Applin) will co-ordinate the action of Divisional machine guns employed for barrage work. The Corps Motor Machine Gun Battery and the Machine Gun Company of the 4<sup>th</sup> New Zealand Infantry Brigade are available to co-operate under his orders.'<sup>75</sup> One of tasks that Applin set himself was to ensure that the attacking infantry was at ease with the sound of the machine gun barrage firing over their heads. This was achieved by demonstrating the tactics in the training camps. Groups of infantry learned to advance with the sound of bullets whistling over their heads and quickly became comfortable with the noise.<sup>76</sup> The war diary of the 25<sup>th</sup> Division stated that on the back of the machine gun barrage, the troops were to be informed that the bullets passing over their heads were from their own barrage and that the bullets were no lower than sixty feet above their heads.<sup>77</sup> A II ANZAC conference was held on 9 May 1917, attended by Lieutenant General A. Godley G.O.C. II ANZAC, Major General J. Monash G.O.C. 3<sup>rd</sup> Australian Division and Major General A.H. Russell G.O.C. New Zealand Division and all their staffs.<sup>78</sup> At the conference Applin explained that he required '4 or 8 Vickers guns per attacking brigade in order to do a satisfactory overhead barrage, Corps will use the whole of the 4<sup>th</sup> company and the whole of the reserve brigade for overhead barrages.'<sup>79</sup> He also informed

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<sup>71</sup> Ibid.

<sup>72</sup> Monash Papers, 10 Feb.-30 Mar. 1917 (Australian War Memorial, RCDIG0000618).

<sup>73</sup> Ibid.

<sup>74</sup> War diary II, ANZAC, General Staff, Mar. 1916-Dec. 1917 (T.N.A., W.O., 95/1032/3, p. 71).

<sup>75</sup> Ibid., p. 71.

<sup>76</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 40

<sup>77</sup> War diary, 25<sup>th</sup> Division, June 1917 (T.N.A., W.O., 95/2224/6, p. 61).

<sup>78</sup> Notes from Corps commanders conference, 9 May 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917).

<sup>79</sup> Notes from Corps commanders conference, 9 May 1917 (Australian War Memorial, RCDIG0000619, Monash Papers, book 15, 1 Apr.-10 May 1917).

the conference that 15,000 rounds in twenty-four hours was the maximum a machine gun could fire.<sup>80</sup> He declared that he was going to provide shrapnel-proof belt filling dugouts in the front line.<sup>81</sup> His last request was that the machine guns 'were to be allotted to him ten days before zero in order to practise their jobs.'<sup>82</sup>

Communications was key to controlling the battle and the machine guns. Most of this was done by telephone using buried armoured wire, but sometimes this wire was cut. Backup systems used signal flags and runners to keep in contact.<sup>83</sup> Applin described his final battle plan in a lecture to the U.S. Army War College on 21 November 1917. When setting up the barrage, he consulted with the general commanding the corps artillery and agreed the timings of the different guns.<sup>84</sup> It was decided to mix the machine gun barrage with the artillery to give complete protection to the infantry. It was agreed that the machine gun barrage would precede the eighteen-pounder barrage by four hundred yards. The practice prior to the Battle of Messines was for the artillery to put down a creeping barrage before the infantry as they advanced towards the German lines. It was the job of the infantry to stay close to this barrage, as it was thought it would keep the German defenders in their shelters, but the Germans had got too used to this and were now ready to fire through the 18-pounder barrage knowing the British infantry were following close behind. Applin's innovation was to fire a machine gun barrage in front of the 18-pounder artillery barrage and thus catch the Germans unawares. This is what happened at Messines and the tactic was a complete success.<sup>85</sup> An II ANZAC corps conference held on 11 May 1917 discussed plans for the upcoming battle.<sup>86</sup> The machine guns were tasked with coordinating closely with the artillery barrage and once in advanced positions could move slightly ahead of it.<sup>87</sup> The co-ordination between Applin as C.M.G.O. and the artillery was noted in the war diaries and he was copied on all the operation orders of the artillery.<sup>88</sup> The after-action report of the II ANZAC backed up this claim and stated

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<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

<sup>82</sup> Ibid.

<sup>83</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 48.

<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

<sup>86</sup> Australian War Memorial, RCDIG0000620, Monash Papers, book 15, 10 May-9 June 1917).

<sup>87</sup> Ibid.

<sup>88</sup> War diary II ANZAC, General Staff, Mar. 1916- Dec. 1917 (T.N.A., W.O., 95/1032/3).

The creeping barrage of the artillery was preceded by a similar machine gun barrage from 144 machine guns, which barrage was placed 400 yards in advance of the artillery barrage. The combination of the two swept the majority of the opposition and enabled the infantry to capture their successive objectives at the time laid down.<sup>89</sup>

During the build up to the battle, the machine gunners fired several different types of barrages. For up to a week before the battle, they fired a harassing barrage. This continued day and night. With a result German prisoners complained that for a full forty-eight hours, no supplies could be brought up as ‘every road and every trench we tried was blocked with machine gun fire, and the carriers refused to go forward’.<sup>90</sup> This harassing fire was designed to go off at odd times and for odd periods to keep the Germans guessing.<sup>91</sup> There was a creeping barrage fired during the battle. The third and most important barrage according to Applin was the S.O.S. barrage. This was used to suppress any enemy counter attack when the infantry was consolidating. There were ninety-two guns firing at any one time and forty-eight in reserve. Applin stressed to the American officers the importance of having a certain portion of guns in reserve and always ready for action at any given time. In order for a barrage to be successful there was a requirement to have the guns calibrated correctly and supplied with enough ammunition.<sup>92</sup> The operations order for the machine guns of the 3<sup>rd</sup> Australian Division set the targets for the attack on Messines – ‘Hostile wire systems, tracks, trenches, hedges, tramlines, buildings, etc., within range will be subjected to intermittent fire throughout hours of darkness and also occasionally in daylight. Fire should be heaviest about dawn and dusk.’<sup>93</sup> The aim of these targets was to prevent the Germans from rewiring gaps cut in the wire especially his rearward wire systems. The Australian 3<sup>rd</sup> Division was to advance to the Green Line by zero plus 10 hours accompanied by a machine gun barrage advancing at the rate of 100 yards every three minutes. Once the Green Line was captured, the barrage was to rest 300 yards in front of the line until zero plus 11 hours 5 minutes when it would stop to allow mounted troops to go forward.<sup>94</sup>

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<sup>89</sup> War diary II ANZAC, General Staff, Mar. 1916-Dec. 1917 (T.N.A., W.O., 95/1032/1, p. 147).

<sup>90</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’, p. 52.

<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

<sup>93</sup> War diary, 12th Machine Gun Company A.I.F., June 1917 (Australian War Memorial, AWM4, 24/17/16, Appendix A).

<sup>94</sup> Ibid.

All of this planning for an S.O.S barrage was put into good effect on the evening of 7 June 1917 during the Battle of Messines. The Germans launched a major counter attack. The British infantry sent up their signal rockets and both the artillery and machine guns laid down their counter fire. Applin described what happened to the German attack

The artillery barrage took a couple of minutes to arrive but the machine gun barrage landed while the rockets were still in the air. “This barrage came down, the weather was dry, and the dust flew, and the masses of Germans, he said, seemed to eddy and then melt away, and there was nothing left – nothing left; and then the artillery came down and blotted it all out.”<sup>95</sup>

Arising from the success of the S.O.S. barrage, Applin was asked by the infantry brigadiers to continue to keep his guns in position for longer than was originally planned. After the battle, there was a tally done of the ammunition used. Harassing fire accounted for 749,000 rounds, the barrage fire used 944,000 rounds and the S.O.S barrage consumed 1,714,000 rounds. Applin pointed out that the Germans became alert to the S.O.S. barrage and copied its signal rockets, hence leading to a waste of ammunition.<sup>96</sup> Two days after the battle, Applin walked over the battle site to see the German communication trenches. There he saw huge numbers of Germans who had been killed by machine gun bullets caught in the S.O.S. barrages.<sup>97</sup>

However, it was not all plain sailing for the machine gunners during the battle, a fact noted by the unit history of the New Zealand Machine Gun Corps.<sup>98</sup> On the night of 5 June 1917 the barrage guns travelled to their positions and remained camouflaged during the day. The rest of the gunners moved into the trenches on the next night during a heavy German gas attack. At zero hour on 7 June 1917, nineteen mines exploded under the German trenches signalling the start of the creeping barrage.<sup>99</sup> The machine guns continued firing for forty-five minutes after zero hour, gradually lifting their fire forward 100 yards every two minutes until they reached the 500 yards beyond the Brown line which was captured relatively quickly.<sup>100</sup> The problem of ammunition supply was hugely difficult and at one stage a supply party arrived across no man’s land carrying 10,000

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<sup>95</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’, p. 52.

<sup>96</sup> Ibid.

<sup>97</sup> Ibid.

<sup>98</sup> Luxford, *With the machine gunners in France & Palestine*, pp 67-77.

<sup>99</sup> Keegan, *The First World War* p. 383.

<sup>100</sup> Luxford, *With the machine gunners in France & Palestine*, pp 68.

rounds to the forward guns.<sup>101</sup> At 3.10 p.m. the last stage of the machine gun battle began. The barrage guns opened fire forming a curtain beyond the Green line. From their elevated position the machine gunners could observe their fire, and cheered loudly when they observed a large body of retreating Germans receiving the full effect of it. At 3.30 p.m. the Green line was captured, the guns ceased fire, but remained ready to open fire in the event of the counter-attack developing.<sup>102</sup> The New Zealand machine gunners won high praise for their actions and put it down to the preparation that they had received before the battle. They were especially proud of how they were able to respond to the S.O.S. calls and they believed this had helped steel the confidence of the infantry in the machine gun and the gunners. All of this praise reflected on Applin who had planned it all. On 9 June 1917, the 4<sup>th</sup> Australian Machine Gun Company relieved the 1<sup>st</sup> New Zealand Machine Gun Company on the Black Line and all the guns of the company were used in a defensive capacity. The war diary recorded how ‘throughout the whole of the operations, standing machine gun barrage was paced 400 yards beyond the artillery barrage. From prisoners statements it appears that the enemy was greatly harassed by the method of fire.’<sup>103</sup> An after-action report noted the benefit of the physical training provided for the troops and the value of the tactical lectures attended by the section officers and N.C.O.s.<sup>104</sup> The report also recorded that ‘as far as reliable information can be obtained, the result of the guns attached to 3<sup>rd</sup> Division was very good and it was stated that the enemy was seriously harassed and suffered considerable casualties.’<sup>105</sup> Under the ‘lessons learned’ section of the report it was stated that more training should be giving to the N.C.O.s. on map-reading so as to improve indirect fire. Also it was argued that more guns should be allocated to the work of indirect fire instead of leaving them in the front line.<sup>106</sup>

At the end of the battle, Major R.D. Hardie, D.M.G.O. of the New Zealand Division, submitted a report to Divisional Headquarters and Applin:

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<sup>101</sup> Ibid., p. 69. Corporal W.N. Thorn received special praise for this action which was achieved without suffering any casualties.

<sup>102</sup> Ibid.

<sup>103</sup> War diary, 4th Machine Gun Company A.I.F., June 1917 (Australian War Memorial, AWM4, 24/9/12).

<sup>104</sup> War diary, 12th Machine Gun Company A.I.F., June 1917 (Australian War Memorial, AWM4, 24/17/16, Appendix D).

<sup>105</sup> Ibid.

<sup>106</sup> Ibid.



1. The co-ordination between barrage guns and groups was most satisfactory. There was, however, a slight lack of co-ordination between group commanders of barrage guns and guns operating with Brigades.
2. It is not considered that it would be preferable for Brigades to control all the machine guns covering their front. Barrage guns are best controlled by D.M.G.O. through group commanders in close co-operation with Brigades. Brigades should control only those guns going forward with the infantry and those co-operating immediately with the infantry. Brigade schemes should be known to all barrage group commanders to ensure complete co-operation. In the Messines offensive it was found that some group commanders were ignorant of the Brigade scheme for guns operating with the infantry, and after the advance certain consolidating guns were detailed to take up positions which were occupied by barrage guns. This was soon rectified, but it would not have occurred had group commanders been in complete touch with Brigade schemes. The machine gun scheme for both Brigade and barrage guns should be known to all machine gun officers.
3. The retention of a large number of guns for barrage purposes in a small area for a long period is not advisable unless the operation demands it. The decision should rest with the D.M.G.O. The general rule for barrage guns should be to withdraw after their job has been carried out and the position is consolidated with the Brigade guns in position. A few guns might be left—say one-third: This however should rest with the D. M.G.O., and should depend on the situation. The guns left should be sufficient to put up a barrage and assist the Brigade guns in case of a counter-attack. The casualties to personnel and guns which occurred amongst the barrage groups in the recent offensive, after their job had been successfully carried out, renders it inadvisable to keep barrage guns in position for a long period. The barrage guns could have been withdrawn after thirty-six hours.<sup>107</sup>

This report confirmed that Applin achieved all of his goals. He had wanted to withdraw the machine guns after the first phase of the battle but had been overruled. This to him resulted in unnecessary casualties and demonstrated the lack of control that he was permitted to exercise. The post of C.M.G.O. was ill-defined at the time and yet Applin was able to plan the successful Battle of Messines within organisational and resource constraints. The major disadvantage of the C.M.G.O. was that he had no direct control of troops. He was only allowed to offer advice on machine gun matters to the Corps commander. Luckily, Applin was able to convince Lieutenant General Godley of the importance of machine guns and thus was given a relatively free rein.<sup>108</sup> However, he did clash with the Corps Artillery Officer over sites for his guns and this awkwardness of command was only solved by Applin's

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<sup>107</sup> Luxford, *With the machine gunners in France & Palestine*, p. 77.

<sup>108</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 36

persuasive powers.<sup>109</sup> George Lindsay drew attention to the role of the C.M.G.O. at this time and how awkward it was when he remarked ‘unless he was a man of exceptional personality and force of character, his position was one in which it was almost impossible for him to achieve any useful purpose.’<sup>110</sup> This constraint is noted by the New Zealand unit history which gave credit to their D.M.G.O. and not the higher ranked Applin. J.H. Luxford in his history of the New Zealand machine gunners had noted the appointment of Applin as C.M.G.O. and welcomed him as a pre-war expert.<sup>111</sup>

At an ANZAC Corps conference held on 4 August 1917, Applin lectured the Divisional commanders on the advantages of machine gun barrages.<sup>112</sup> At the conference where Major General John Monash, commander of the Australian Division, cautioned that ‘we mustn’t lose sight of shooting over sights’.<sup>113</sup> The Australian 3<sup>rd</sup> Division launched an attack on the Warneton trenches on 31 July 1917. Applin planned the machine gun element and used forty-eight guns to lay a machine gun barrage. Following on from Messines, for several days and nights prior to zero hour, harassing fire was used to good effect against roads and tracks leading to the front, this had the effect of downgrading the Germans’ ability to bring up supplies.<sup>114</sup>

The operation plan for the machine guns of X Corps, as designed by the C.M.G.O. Lieutenant Colonel H.F Bidder, was similar to Applin’s plan. Bidder had 148 machine guns available, forty to conduct preliminary harassing fire and 108 guns to provide a machine gun barrage. In all, X corps would fire over 5,000,000 rounds in the action.<sup>115</sup> A memorandum dated 23 May 1917 set out the details of the barrage to be fired and emphasised the training of the N.C.O.s to be able to direct the fire and movement of the guns.<sup>116</sup> The operation order for the battle noted the role of C.M.G.O. He was to ‘assist Divisions in the instruction of the personnel employed in the barrage. He will carry

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<sup>109</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’, p. 53.

<sup>110</sup> Criticism of revised proof of S.S.192 and review of whole Machine Gun subject, 14 Dec. 1917 (B.T.M., Lindsay Papers E2004.1999. C41, p. 13).

<sup>111</sup> Luxford, *With the machine gunners in France & Palestine*, p. 64.

<sup>112</sup> Australian War Memorial, RCDIG0000622, Monash Papers, book 16, 1 Aug.-30 Sept. 1917).

<sup>113</sup> Ibid.

<sup>114</sup> Ibid.

<sup>115</sup> Lessons learnt [sic] from Messines – Wytschaete operations – machine guns, 1917 (T.N.A., W.O., 158/298, Appendix II).

<sup>116</sup> Ibid., Appendix III.

out any additional instruction he can at Corps Headquarters, and Divisions will give facilities for the attendance of personnel'.<sup>117</sup> Therefore he had no direct control of troops and could only issue instructions as opposed to orders. Another memorandum recorded that the employment of machine guns under Corps control was only intended to make use of the guns for covering fire and was not intended to reduce the number of guns under the control of the infantry brigades.<sup>118</sup> Again, this demonstrates the problem of control of machine guns. On the one hand, for barrage work they need to be controlled centrally at corps level but the infantry commanders also want them under their direct control for subsequent work. The after-action report of the X Corps gave credit to the Canadians for the design of the barrage which was described as extremely simple and it was this simplicity that made it work so well.<sup>119</sup> The report noted

Although the preparations for the scheme only occupied some three weeks, and there was extremely little opportunity for anything in the nature of special training, some 2,000,000 rounds were fired over the heads of our own troops by 108 guns without a single complaint that the bullets were dropping short: while from information obtained from German prisoners it would appear that the effect on the enemy was considerable.<sup>120</sup>

Lieutenant Colonel H.F Bidder, like Applin, selected the battery positions and then allowed the acting D.M.G.O. of each division to site the guns.<sup>121</sup> The report noted that the machine gunners were exhausted after forty-eight hours and needed to be replaced. The report also demonstrated that little time for training had been allocated and the scheme was successful because of its simplicity.<sup>122</sup>

On 14 May 1917 the machine gun units of IX Corps started to plan for the Messines offensive. Acting D.M.G.O.s were appointed and required to work in close contact with the C.M.G.O.<sup>123</sup> Once the machine gun barrage was agreed with the C.M.G.O. it could not be altered without Corps approval. A memorandum mentioned that 'it was a waste of valuable weapons to allocate machine guns to battalions. Battalion commanders and brigade staffs have too much to think about to give the necessary

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<sup>117</sup> Ibid., Appendix VI.

<sup>118</sup> Ibid., Appendix VI(i).

<sup>119</sup> Lessons learnt [sic] from Messines – Wytschaete operations – machine guns, 1917 (T.N.A., W.O., 158/298).

<sup>120</sup> Ibid.

<sup>121</sup> Ibid.

<sup>122</sup> Ibid.

<sup>123</sup> 19<sup>th</sup> Division: Machine guns; tactical and technical lessons learnt, 1917 (T.N.A., W.O., 158/418).

attention to the machine guns allocated to them and this is becoming more and more recognised.<sup>124</sup> The IX Corps employed 162 machine guns, sixty-six from the 36<sup>th</sup> Division, forty-four from the 16<sup>th</sup> Division and fifty-two from 19<sup>th</sup> Division.<sup>125</sup> An after-action report by Captain J. Winton Garden, commanding the 33<sup>rd</sup> Machine Gun Company, mentioned that large numbers of German dead killed by machine gun fire while apparently attempting to retreat from their trenches.<sup>126</sup> Garden concluded his report with the assertion that from a machine gun point of view, the operations were extraordinarily successful and ‘much more use was made of the guns in these operations than in the earlier days of the Somme fighting, and it is hoped that in the future operations that machine guns companies will be allowed to take as brilliant a part as they did on the 7<sup>th</sup> instant.’<sup>127</sup> However not all officers were convinced. Major J.S. Miller D.M.G.O. of 36<sup>th</sup> Division, noted that the machine guns allotted to the infantry brigades ‘were unemployed and wasted and that the guns sent forward with the infantry could not see to fire owing to smoke and dust and were also unemployed.’<sup>128</sup> He also thought that all of the guns of the division should have been left under the control of the D.M.G.O. which would have been a more efficient use of them.<sup>129</sup>

The after-action reports of the IX and X Corps machine gun units, who fought alongside Applin in the battle of Messines, back up his experiences. They each acknowledged the work of the Canadians and Brutinel in formulating the idea of barrage fire. Both the IX and X Corps allocated less machine guns to barrage fire than Applin and all of the after-action reports acknowledged the benefit of the new tactic. As noted by Cornish, and shown in Table 1, the machine gun barrage fired by Applin was more complex and used more machine guns than any other unit apart from the Canadians.<sup>130</sup>

The Battles of Vimy Ridge and Messines in early 1917 were hugely important in the development of machine gun doctrine. Barrage fire was employed to full effect under the guidance of Brutinel and Applin. It was realised that these machine gun tactics were radically new and worthwhile, and thoughts turned to how

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<sup>124</sup> Ibid.

<sup>125</sup> Ibid., Appendix I.

<sup>126</sup> Ibid.

<sup>127</sup> Ibid.

<sup>128</sup> 19<sup>th</sup> Division: Machine guns; tactical and technical lessons learnt, 1917 (T.N.A., W.O., 158/418).

<sup>129</sup> Ibid.

<sup>130</sup> Cornish, *Machine guns & the Great War*, p. 100.

to disseminate them to the rest of the army. Field Marshal Haig in July 1917 on a visit to the New Zealand machine gunners after the Battle of Messines mentioned that he had carefully noted the reports on the work of the machine guns in that operation, and considered it was worthy of ‘text book repetition’ and said machine gun development was only in its infancy.<sup>131</sup> It had taken nearly two and a half years of war for offensive machine gun tactics to be finally accepted by the British High Command. Haig was now determined to address this and during the summer of 1917 put in train a series of demonstrations on the sands at Camiers to showcase the new tactics.<sup>132</sup>

Major General John Monash, commander of 3<sup>rd</sup> Australian Division articulated his thoughts on machine guns in a memo dated 8 August 1917 to Corps HQ when he was addressing the problems for the dispositions for the attack and for the repulse of the counter attack. He wrote

8. The value of the defensive, as distinguished from the offensive, machine gun barrage is still not widely recognised, but all experiences in this Army point to its undoubted value – while it is expensive of ammunition and of barrels, such expenditure is justified by the security afforded.

9. A portion of both artillery and machine gun barrages should invariably search in depth, coming back at short intervals to the ‘protective’ line which marks their minimum ranges. To render a Machine Gun Barrage sufficiently dense to be effective, and also to provide for a satisfactory reserve of guns and crews (to replace casualties and for rest) it is usually necessary and desirable to bring into the Machine Gun Companies of all reserve formations.<sup>133</sup>

These thoughts are from an infantry commander and demonstrate the acceptance of the new practice of barrage fire but with a hint of a warning not to neglect the defensive use of machine guns. When General Plumer, Commander of the Second Army, issued new ‘notes for training and preparation for offensive operations’ in August 1917 machine guns were afforded special mention

1. All experience goes to show the increasing value of machine gun fire, both for offensive and defensive purposes.

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<sup>131</sup> Luxford, *With the machine gunners in France & Palestine*, p. 82.

<sup>132</sup> See next section.

<sup>133</sup> Australian War Memorial, RCDIG0000622, Monash Papers, book 16, 1 Aug.-30 Sept. 1917).

2. Special attention must be paid to bringing a harassing fire on the area likely to contain enemy machine guns which are endeavouring to put a barrage against our attacking infantry.
3. The greatest attention is required in the arrangement of machine gun barrages, and the closest working with the artillery is necessary to ensure success.
4. Experience has shown that machine guns sent forward with the assaulting waves almost invariably get knocked out or suffer such losses of personnel as to be practically useless on arrival at the objective.
5. The best solution with regard to forward guns would seem to be for the sections to follow closely behind the battalion to which they are attached, and to attain their objective by a series of bounds previously reconnoitred in each case by the section commander.
6. Every preparation must be made for moving forward barrage guns by "bounds." It has been found that a bound of 800 yards. Can be accomplished, and the guns set up in their new position and ready to fire, in one hour.<sup>134</sup>

Again, this demonstrated an acceptance at the very top level of the army of the importance of machine guns and their integration into the overall battle plan. A tactical resumé of the different army machine gun practices was produced during September 1917. It summarised the machine gun lessons as follows

- a) The evolution of machine gun tactics is proceeding along clear and pronounced lines.
- b) The lines of evolution are the same in the attack and in defence i.e. towards the closer grouping of guns to facilitate control.
- c) The offensive spirit which dominate modern machine gunnery has provided a key to progress in the tactical organisation of machine guns and the direction of machine gun fire , which has greatly enhanced the value of the assistance which they can render infantry battalions in both defensive and offensive action.
- d) In modern machine gunnery indirect fire is not rival, but complementary to direct fire.
- e) That the operation of MOBILE guns must be arranged with just as much care and attention to detail as those of the BARRAGE guns.<sup>135</sup>

This is further evidence of the roll out of a standardized machine gun doctrine across the British Army based on lessons learnt during the battles of early 1917. The VIII Corps

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<sup>134</sup> 'Notes for training and preparation for offensive operations,' Second Army (Australian War Memorial, RCDIG0000622, Monash Papers, book 16, 1 Aug.-30 Sept. 1917).

<sup>135</sup> Tactical resumé of army machine gun reports for the month of September 1917, 28 October 1917, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 2, File 9)

commander, Lieutenant General Sir Alymer Hunter-Weston, issued machine gun instructions to his divisions in September 1917. Entitled ‘principles for the employment of machine in defence’ it set out the new guidelines then coming into operation and was a demonstration of how machine guns were becoming more relevant to the battlefield.<sup>136</sup> It stated ‘barrage fire properly used is of great value, but the fire that annihilates is the direct fire of machine guns at close range.’<sup>137</sup> Another instruction from Hunter-Weston noted that ‘it should be unnecessary to state that a plan for machine gun defence should never be made out as a separate scheme without the closest co-operation between Machine Gun Officers, the infantry, the Artillery and the General Staff. But, unfortunately, one of the most common mistakes is that the machine gun, infantry and artillery plans are not co-ordinated.’<sup>138</sup> This attempt by Hunter-Weston demonstrated the problems that corps commanders faced in disseminating doctrine to lower tactical levels of their units. Machine guns needed to be coordinated properly with others arms to make the most efficient use of them.

#### MACHINE GUN DEMONSTRATION AT CAMIERS

A demonstration organised by George Lindsay and authorised by Field Marshal Haig, assembled all commanders of the four British Armies, all Corps commanders, including the Canadian Corps, the two A.N.Z.A.C. and all the senior commanders of G.H.Q. at the beach in Camiers in August 1917.<sup>139</sup> The demonstration was designed to show all new developments in barrage fire that had originated in the Small Arms School at Camiers. Following on from the work of Brutinel and Applin, George Lindsay had taken those initial schemes and refined them, and prepared demonstrations to showcase what could be achieved. Lindsay described the object of the main exercise as illustrating the combined

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<sup>136</sup> ‘Principles for the employment of machine in defence’, War diary Alymer Hunter-Weston, October 1917, (British Library, Hunter-Weston papers, - Add MS 48359) p. 66.

<sup>137</sup> Ibid.

<sup>138</sup> ‘Notes on making out a machine gun scheme for a defensive line’, War diary Alymer Hunter-Weston, October 1917, (British Library, Hunter-Weston papers, - Add MS 48359) p. 127.

<sup>139</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* (Farnham, Ashgate, 2010), p. 159. General Horne noted his visit to Camiers to view the machine gun demonstrations in August 1917 in his diary.

action of two machine gun companies assisting the infantry in the attack.<sup>140</sup> It was designed to show the method of commanding groups of guns and the power of control of large numbers of guns and also to demonstrate how new mapping, fire organisation orders and fire charts could be used together to produce a concentrated machine gun barrage.<sup>141</sup> A schedule of events listed a barrage being fired from fixed positions for eight minutes and then moving to the beach from where different barrages were fired. They consisted of an S.O.S. barrage of two minutes duration, a box barrage of two minutes duration, a concentrated barrage of two minutes and a switch barrage on request.<sup>142</sup> In total, thirty-two machine guns were used and it was agreed by all those present that the demonstration was a success.<sup>143</sup> Field Marshal Haig in particular was impressed with the demonstration and noted the result in his diary.<sup>144</sup> As part of his input into the display, he ordered a concentration of fire to meet an imaginary attack from the flank and was suitably impressed when it was fired successfully within one minute of giving the order.<sup>145</sup> Over 130 senior officers attended the demonstration with their staffs.<sup>146</sup> Applin mentions in his memoirs that he was in attendance and described when, as part of the demonstration, the senior officers retired to dugouts on the beach:

Then I had the privilege of going down and sitting in a dugout on the beach; my feet were just outside, and I was asked to take them in, because the bullets would drop very close to my toes; and Sir Douglas Haig and all these great generals were there sitting in these dugouts, and then the guns that we seen already laid, opened fire , and on the wet sand of the beach in front of us we heard the soft patter of hail – for that is what it sounded like – we saw the sand go up in little spurts, like this in a line all the way along, deep – a very deep, long line – the whole sand going up in little spurts as though there were a heavy shower of hail, a heavy hail storm. Only each one of those hail-stones was .303 bullet. When that demonstration was over, there was not a General there, however prejudiced he

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<sup>140</sup> Programme of M.G. demonstration at Camiers, & names of personalities attending (snaps attached) (B.T.M., Lindsay Papers E2004.1973.C36). The pictures from this file could not be found in Bovington, one of which shows Brutinel with Applin according to Ian M. McCulloch. Ian M. McCulloch, 'A war of machines – a re-assessment of the Canadian Machine Gun Corps: innovation or tactical expedient?' in *Canadian Army Journal*, xi, no.2 (Summer 2008), p. 86.

<sup>141</sup> Ibid.

<sup>142</sup> Ibid.

<sup>143</sup> Ibid.

<sup>144</sup> Field Marshal Sir Douglas Haig diaries, 18 Aug. 1918, 1914-18 (T.N.A., W.O., 256/21 pp 33-4).

<sup>145</sup> Ibid.

<sup>146</sup> Hutchinson, *Machine guns*, p. 193. According to Hutchinson there were 130 General officers present on that date and he also stated that over the succeeding months 300 senior British officers, as well as officers from France, Belgium, Italy, America, Denmark and Japan attended similar demonstrations.



may have been before, that was not convinced of one thing, and that was that he himself under no circumstances would have dashed across that space.<sup>147</sup>

As emphasised above several senior officers noted the demonstration on Camiers in their diaries: Field Marshal Haig, General H. Horne G.O.C First Army and Lieutenant General Sir Alymer Hunter Weston G.O.C. VIII Corps made diary entries and Major General J. Monash kept the day's itinerary in his files.<sup>148</sup> Applin's record is significant as it demonstrates that it was only then that machine gun barrage fire was accepted for widespread army use. It was now essential that barrage fire be integrated into the attack plans of the British Army. Lindsay was to play a key role in its implementation through the introduction of his new tactical manual SS192. All the senior machine gun officers discussed in this thesis, Lindsay, Brutinel, Applin and Hutchinson made reference to these machine gun demonstrations on the beach at Camiers and stressed how important they were. Barrage fire was a joint effort between all the major machine gun innovators. Applin had trialled indirect fire in 1904 in South Africa and it was taken up by the others during the war. The demonstrations at Camiers in the summer of 1917 finally proved that it could be used on a wide scale. Applin's role has been forgotten but he was the key innovator and arguably he would have played a bigger part had he not been despatched to America. Some training films exist of machine gun demonstrations on the beach in Camiers dating from this period.<sup>149</sup>

Haig played a very important role here at Camiers. After the Battle of Messines in June 1917, he realised the significant contribution that machine guns could play in future battles as offensive weapons. Hence he collected all his senior commanders to view and discuss this new tactic. In this role he acts as a senior leader encouraging innovation as defined by Stephen Rosen in his theory of cultural innovation.<sup>150</sup>

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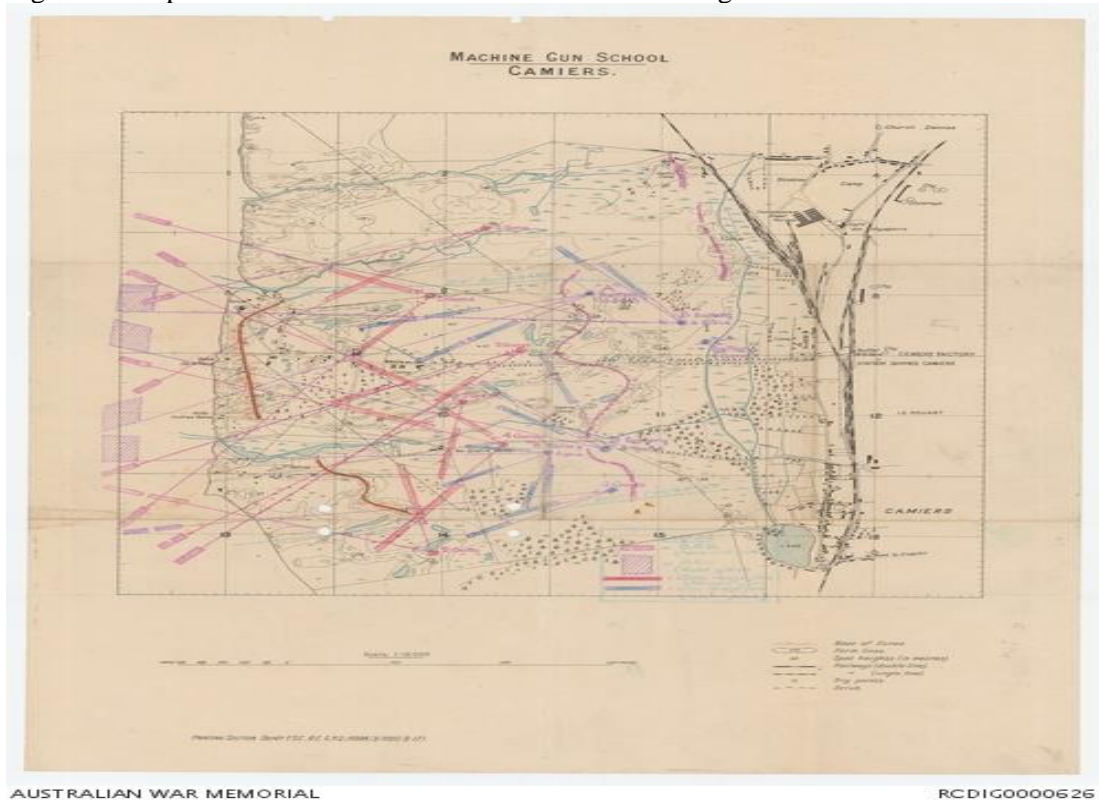
<sup>147</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', pp 34-5. Paddy Griffith in his book *Battle tactics of the Western Front* states that the demonstration occurred on 18 or 20 Aug. 1917.

<sup>148</sup> Australian War Memorial, RCDIG0000622, Monash Papers, book 16, 1 Aug.-30 Sept. 1917. War diary Alymer Hunter-Weston, August 1917, (British Library, Hunter-Weston papers, - Add MS 48366).

<sup>149</sup> <http://www.iwm.org.uk/collections/item/object/1060023373>, Imperial War Museum at Catalogue number IWM 1055c

<sup>150</sup> See pages 344-48 for a more complete discussion of Haig and his interest in machine guns.

Figure 37 Map of Machine Gun School Camiers with training scheme



Source: Australian War Memorial at <http://www.awm.gov.au>

#### APPLIN IN AMERICA 1917-1918

On the outbreak of war in 1914, the USA declared itself neutral in the European war but at the same time was able to profit from the conflict. Logistic support was largely supplied to the Allied side and indeed, US industry rushed to sell goods to Britain and France. The procurement of military goods was conducted through civilian middlemen to protect American neutrality. Military links were more sensitive and contacts – when undertaken – were treated with secrecy. In April 1916 Lindsay hosted a visit by an American officer, Captain Castle, to the Machine Gun School at Grantham.<sup>151</sup> Castle was supplied with the most up to date literature on machine guns including Lindsay's 'strategical [sic] paper' and also a suggested format for the organisation of a machine gun corps. Lindsay stressed the importance of establishing such a force on a sound basis and urged that it would be totally independent from the infantry. When Castle wrote to thank

<sup>151</sup> Letters from Captain Castle, 27 Apr. 1916 (B.T.M., Lindsay Papers E2004.1957. C24).

him for the visit and information, he asked him to keep details of the visit private as America was still neutral at that stage of the war.<sup>152</sup> The details of Castle's visit were published in America in 1918 along with Lindsay's strategical [sic] essay and some of Applin's American lectures.<sup>153</sup> On arrival in France, the A.E.F. adopted SS192 and Lindsay was called upon to lecture at the American General Staff College.<sup>154</sup>

However, the most significant liaison concerning machine guns between the British and American armies occurred when Colonel R.V.K Applin was posted to Washington to head a machine gun mission in September 1917. When America declared war on Germany in April 1917, the US government asked for help from the Allies to prepare for modern war. Both the British and French authorities offered aid and established military missions to the US. It was decided that the British Army would assist in the development of machine gun doctrine. As part of this aid, a British Machine Gun Mission was established in September 1917. The American authorities requested Applin because he was known to them as an expert in the use of machine guns.<sup>155</sup> We need not only take Applin's word for this. His book *Machine gun tactics* was widely distributed among military libraries in the US including the library at Fort Sill, home to the School of Musketry.<sup>156</sup> His work was quoted by American writers in support of their theories and his ideas were well known in the American machine gun officer community. Therefore, he was the ideal officer to command this mission. Indeed, an American machine gun book entitled *Machine guns* was published privately by three American officers in 1916, one of whom Lieutenant Harry J. Malony of the 26<sup>th</sup> Infantry used examples from Applin's 1910 book to support his own ideas.<sup>157</sup> He was particularly interested in the notion of overhead fire and quoted Applin

The moral effect of firing over our own troops which it was feared would be demoralizing, was on the contrary reassuring and aroused the attacking spirit, as

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<sup>152</sup> Ibid.

<sup>153</sup> War Department, *Machine gun notes no. 2 from British sources* (Washington, 1918), pp 96-117.

<sup>154</sup> Correspondence and text regarding lectures in England and the controversy about them, Mar. 1919 (B.T.M., Lindsay Papers E2004.2743).

<sup>155</sup> Applin, *Across the seven seas*, p. 266.

<sup>156</sup> *School of musketry library – Fort Sill Oklahoma – list of books on shelves November 15, 1916* (Oklahoma, 1916).

<sup>157</sup> Julian S. Hatcher, Wilhelm P. Glenn, and Harry J. Malony, *Machine guns* (Texas, 1917), pp 210-11 (hereafter Hatcher, Glenn & Malony, *Machine guns*).

the men know that the enemy will be covered with heavy machine gun fire during their rushes.<sup>158</sup>

Applin had written this back in 1910 and used it successfully during the Battle of Messines: the Americans were now discussing it in 1916. One result of the American book was to reintroduce Applin to an American audience and it was this publicity that led to the request by the War Department to the British Authorities to send R.V.K. Applin to America to help train machine gunners in September 1917.<sup>159</sup>

Applin arrived in America in October 1917 via Canada, accompanied by thirty-three officers and thirty-three sergeants.<sup>160</sup> An officer and a sergeant were sent to each division to aid with machine gun training. The purpose of Applin's mission was to pass on his recent experiences of machine guns to the newly emerging A.E.F. and so he set to work immediately. Based in Washington with the British Military Mission, one of his first tasks was to deliver a lecture to the Society of the Colonial Wars entitled 'Our task in the war'. The lecture was attended by the Acting Chief of Staff, Major General John Biddle and other senior officers of the War Office.<sup>161</sup> Applin notes in his memoirs that based on this lecture he was asked to deliver a lecture on the battle of Messines to the War College.<sup>162</sup> However, the lecture to the officers of the War College occurred on 20 November 1917 and the lecture to the Society of the Colonial Wars occurred on 4 December 1917. Applin had a tendency to mix up dates in his memoirs but they still provide a useful account of his activities in America. As well as discussing machine guns, he addressed issues of discipline and obedience to orders. He was concerned that the average American citizen soldier would have trouble facing the German trenches on the Western Front without firm discipline and belief in the cause he was fighting. So as part of his lecture series he spoke about these important matters. He wanted to instil enthusiasm for the Allied cause and made every effort to encourage this. In January 1918 Applin undertook a tour of the Southern US states to discuss modern machine gun tactics and discipline. On his travels he took great comfort from the fact that most Americans

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<sup>158</sup> Ibid., p. 219.

<sup>159</sup> Applin, *Across the seven seas*, p. 266.

<sup>160</sup> Ibid.

<sup>161</sup> Applin, R.V.K., *Our task in the war* (Washington, 1917).

<sup>162</sup> R.V.K. Applin, 'Tactics of the machine gun' in *Infantry Journal*, xiv (July 1917 to June 1918), (hereafter Applin, 'Tactics of the machine gun').

bore loyalty to the American flag. By the time he left America he was convinced that the American armies which had been formed would do their duty for the Allied cause.

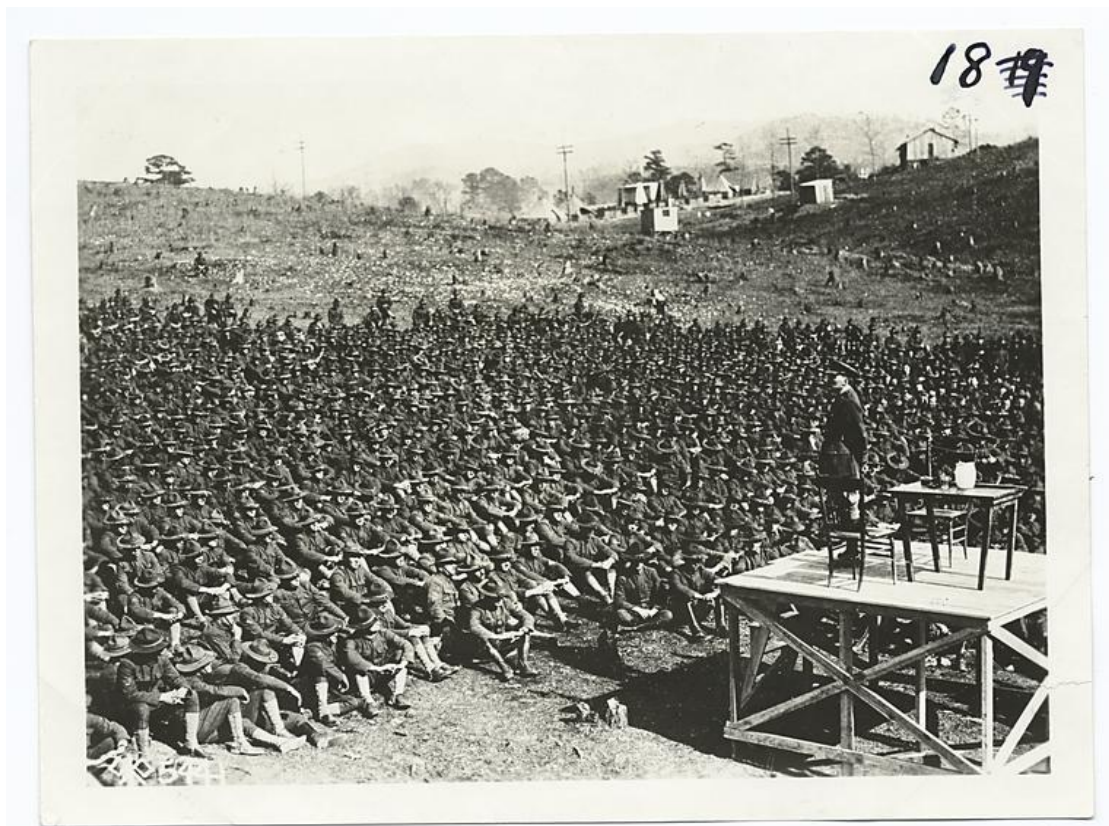


Figure 38: 29th Division in training at Camp McClellan, Alabama. Lieutenant Colonel R.V.K. Applin of the British Army addressing 4,000 non-commissioned officers on the subject of discipline and obedience to orders, 15 Feb. 1918. Source: N.Y.P.L. Digital Gallery.

It was a major commitment on the part of the British Army to send Applin to America. He proved at Messines that he was a capable commander and yet the British Army were willing to allow him to travel to the US. This was due in part to his stature as a machine gun innovator and instructor. There does not seem to have been any malicious intent in selecting Applin to run the American Machine Gun Mission. His work was known in America and he fitted the requirement so he was sent.<sup>163</sup> Applin wrote some articles for the American military press which extended his influence. He penned an article for the *Infantry Journal* entitled ‘Tactics of

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<sup>163</sup> Applin, *Across the seven seas*, Applin recounts that Lieutenant General Godley, commander of II ANZAC held a farewell dinner for him and wished him ‘God-speed’.

machine guns' which was published in the July 1918 issue.<sup>164</sup> This was based on one of the lectures he had delivered to the War College in November 1918. It was also published in *Machine gun notes, no. 2 (from British sources)* published by the War College in February 1918. In this lecture he had addressed the idea of the machine gun as a life saver. Up to then the British Army had only understood the machine gun as a 'life taker'. What Applin meant by this phrase was that machine guns had two functions, to assist movement and to prevent movement.<sup>165</sup> During 1917 the British army began to plan attacks in great detail. As part of this, machine gun barrages began to be used. Applin played a major part in this process and so developed the idea of machine guns being used to support attacks. From then on, machine guns came to be regarded as saving the lives of the attacking Allied forces.<sup>166</sup> Applin wrote 'Fire is for the purpose of assisting the movement of your own troops, enabling them to go forward, or to prevent the movement of the enemy's troops, to prevent him from going forward to engage against you'.<sup>167</sup> The industrial might of the British Empire was now being harnessed to fight the war and there was a plentiful supply of arms and ammunition. But Applin's idea of machine guns being used as life takers was not new. Indeed, this had been the traditional view of machine guns. They were to be used to defeat the attacking infantry and protect territory. However, key to Applin's contribution to machine gun doctrine was that he expanded on this and explained that in order to do this, machine guns had to be sited correctly.<sup>168</sup> Heavy machine guns could no longer be placed in the front lines and be left vulnerable to artillery. They had to be hidden away from the front lines but yet be able to cover the approaches. Light machine guns like the Lewis could be used in the front line.<sup>169</sup> Applin went on to explain to his audience, what a cone of fire, fired by a well sited machine gun could do

We have found out by careful experiment that, although this cone is so narrow and deep at a longer range than 1,500 yards, those cones can be made to overlap by a very little movement on the part of the firer of the gun; by moving it ever so little backward and forward at any distant range he can sweep an area of space so

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<sup>164</sup> R.V.K. Applin, 'Tactics of the machine gun' in *Infantry Journal*, xiv (July 1917 to June 1918), p. 755 (hereafter Applin, 'Tactics of the machine gun').

<sup>165</sup> Applin, 'Tactics of the machine gun'

<sup>166</sup> *Ibid.*, p. 762.

<sup>167</sup> *Ibid.*, p. 755.

<sup>168</sup> *Ibid.*

<sup>169</sup> *Ibid.*

rapidly with those cones that it is impossible for any living thing to get in between. By traversing in this way you can cover 50 yards of front.<sup>170</sup>

Applin did not believe that machine guns alone could win the battle. Machine guns were merely part of the equation – to assist movement by the infantry, to get them into the enemy trench where the bayonet would do the final winning. The central message of the lecture was summed up as follows

When handling the machine guns, remember the object is to support the attack, to assist movement, or to prevent movement. Remember that the cone of fire is deep and narrow, and that it never rises above the height of a man on a plane at 600 yards, and 700 yards and 800 yards with your guns. Therefore the flanks are the best place to use the machine guns. Secondly, remember that the enemy will do everything he knows to knock out your machine guns, so conceal them by the aid of cover... Thirdly, remember that the greatest effect is always obtained by surprise.<sup>171</sup>

Another lecture that Applin gave to a group of American officers at the War College on 20 November 1917 dealt with the tactical employment of machine guns. His main message in this lecture he summed up in three words: ‘concealment; flanks; surprise.’ He introduced examples of engagements from Europe where the British Army learned lessons to demonstrate these points. One such engagement occurred early in the war at Messines.<sup>172</sup> A squadron of cavalry armed with two machine guns was set to delay the German advance. One gun was set at a crossroads and the other was concealed in a nearby turnip field. The gun at the crossroads was easily destroyed, but the gun in the field held up the German advance for a day even though the field was heavily shelled.<sup>173</sup> Applin drew the conclusion from this action that a properly concealed gun could have enormous consequences. Other examples demonstrated how machine guns were used as flanking and surprise weapons. Applin emphasised that machine gun troops should be taken from the very best soldiers available, be well trained and have excellent discipline. They had to be able to react quickly and accurately in all circumstances and this was only achieved through training.<sup>174</sup> To a European audience these lectures would have

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<sup>170</sup> Applin, ‘Tactics of the machine gun’ p. 760.

<sup>171</sup> Ibid., p. 762.

<sup>172</sup> Applin, ‘Lecture on machine guns and their tactical employment’ in *Machine gun notes, no. 2 (from British sources)*, p. 22.

<sup>173</sup> Ibid.

<sup>174</sup> Ibid.

appeared outdated but his was an American audience who were effectively learning from scratch.

Applin made several visits to US Divisions while in America. By and large the reception he received was positive and generally the advice he gave was taken in a good spirit.<sup>175</sup> At one such event at Camp Greene, North Carolina, Applin delivered two lectures, one on discipline and training and the other on machine gun tactics to the 4<sup>th</sup> US Division. The lectures were attended by over 1,700 officers and 1,100 sergeants and the author, Christian Bach, notes that Applin left a great impression on his audience.<sup>176</sup> In January 1918 Applin lectured the NCOs of the 33<sup>rd</sup> Division. His comments generated such interest that they were subsequently published in a pamphlet and distributed to all officers and NCOs of the division.<sup>177</sup>

Applin was regarded as a good speaker with an ability to get his ideas across in a clear and concise manner. While in India, one of his sergeants was asked if Applin could lecture. ‘The sergeant replied: “what? The Cap’n? Why, he can talk for ‘alf an ‘our about a ‘aversack!”’<sup>178</sup> His American lectures were published in the American military press which brought his ideas to a wider audience and thus they had a much greater impact. In his memoirs *Across the seven years* he published some letters he received from his hosts. As one would expect they were generally complimentary and spoke highly of his impact.<sup>179</sup> They reference his style of delivery, the content of the lectures and the impression he left behind. Yet one comment was slightly negative. In one address Applin spoke of the ‘English’ way of doing things, smartly and with total obedience. In response his critic remarked ‘we have our own methods of doing things, and however much we admire the bloody blighters from Hengland [sic], we would much rawther [sic] lick the Hun in our own crude, democratic way.’<sup>180</sup> This comment highlights some of the problems that the British and French advisors faced in America, namely that the Americans knew best and would do it their own way. Unfortunately, the American doughboys would suffer heavily because of this attitude.<sup>181</sup>

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<sup>175</sup> John G. Little, *The official history of the Eighty Sixth Division* (Chicago, 1921), p. 29.

<sup>176</sup> Christian A. Bach, *The history of the Fourth Division, its services and achievements in the world war* (Washington, 1920), p. 27.

<sup>177</sup> Frederic Louis Huidekoper, *The history of the 33<sup>rd</sup> Division A.E.F.* (Springfield, Illinois, 1921) p.16

<sup>178</sup> Applin *Across the seven seas*, p. 247.

<sup>179</sup> *Ibid.*, p. 348.

<sup>180</sup> *Ibid.*

<sup>181</sup> *Ibid.* p. 297.



Applin's lectures in America during Autumn 1917 were the very pinnacle of British Army machine gun doctrine. He returns to his pre-war ideas about movement around the battlefield. The pre-war General Staff had proposed assault tactics at the point of the bayonet, whereas machine gun advocates had proposed the development of fire superiority by the infantry armed with light automatic weapons. The General Staff won out, not surprisingly in the end, and that was how the British Army went to war. By 1917 it had been recognised that troops needed protection to move forward across no man's land and this movement was now being assisted by machine gun fire and artillery in the form of rolling barrages. It had taken years of slaughter for this concept to be finally accepted. Applin never believed or claimed that machine guns on their own could win battles. To him, they were an aid to the infantry and he was very keen to get this point across to his American audience. He had been proved correct in his forecasts of how machine guns would be used and the evidence was there for all to see.

Applin was recalled to England during the summer of 1918. He felt he had contributed in some small way to the winning of the war but reflected that it had probably cost him the rank of general.<sup>182</sup> On his return to France in September 1918, he was posted to the headquarters of the A.E.F. at Chaumont as a liaison officer.<sup>183</sup> Touring the American training camps, he was dismayed to find machine guns situated in the firing line, contrary to what he had taught in America. On querying this development, he found that his teachings had not been entirely accepted by General Pershing.<sup>184</sup>

Applin was not very enamoured by Pershing. Indeed, he was very critical of the number of casualties incurred by the Americans through their refusal to accept his advice. Applin was disgusted with this rejection of his teachings. He described his reaction in his autobiography *Across the Seven Seas*: 'the whole training and organisation of the machine guns that I had worked so hard in America was thrown away by this obstinate man, and I heard that they suffered more heavily in proportion to their numbers than any other arm.'<sup>185</sup> Pershing had a very peculiar attitude to machine guns even though he had

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<sup>182</sup> Ibid. p. 292.

<sup>183</sup> Ibid. p. 297.

<sup>184</sup> Ibid. p. 296. *United States Army in the World War, 1917-1919, general orders, GHQ, AEF* (vol. 12-15, Washington, 1988), xiv, p. 305. . In August 1917 in a document entitled 'The general principles governing the training of units of the American Expeditionary Forces', Pershing emphasised that the rifle and bayonet were the principal weapons of the infantry.

<sup>185</sup> Ibid. p. 348.

witnessed them in action in the Russo-Japanese War of 1904-05. He very much believed in the power of the rifleman as the winner of battles and referring to the infantryman he said 'It is he who constitutes our main reliance in battle.'<sup>186</sup> With this anti-machine gun attitude embedded among the American top brass, Applin teachings had no chance of making a difference. Applin was not the only Allied officer to have his advice rejected or ignored and the A.E.F. was to learn the lessons of modern warfare the hard way. As this thesis has highlighted in the examination of the career of John Henry Parker, General Pershing can be seen to act as an inhibitor of Applin's ideas of machine gun doctrine along the lines that MacDonald and Jungdahl hypothesise. Applin's transfer to America can also be seen in the light of a transnational professional military culture which can, if nurtured correctly, provide the ideal fallow ground for innovation to take place.<sup>187</sup> This theory was developed by Theo Farrell. Unfortunately, in this case of Applin his teaching was not followed through to his satisfaction.

After the war Applin was appointed commanding officer of the 14<sup>th</sup> Hussars with the rank of lieutenant colonel. Applin left the army in 1921 and got elected to parliament in 1924 as a Conservative MP. He retired from politics in 1935 and emigrated to South Africa. During his time in parliament he made several contributions to debates on machine guns mostly in regard to protecting the good name of the Machine Gun Corps.<sup>188</sup>

What was Applin's legacy to the American war effort? His lectures were well attended and his comments were well received. He was frustrated as his ideas faced opposition from higher authorities. Like so many British and French officers the advice he gave was often not acted upon. This is due in part to outdated thinking by senior American officers. General Pershing believed that America would fight the war with Germany on its own terms and using its own ideas. This meant that while an officer like Applin was listened to and thanked for his efforts, the A.E.F. would develop its own ideas and organisational structures. Applin was formally thanked by the US Secretary of State for his role in the British Mission.<sup>189</sup>

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<sup>186</sup> Virgil Ney, *Organisation and equipment of the infantry rifle squad: from valley forge to road* (Fort Belvoir, Virginia, 1965), p. 32.

<sup>187</sup> Adam Grissom, 'The future of military innovation studies' in *Journal of Strategic Studies*, xxix, no. 5 (Oct. 2006). p. 917.

<sup>188</sup> Hansard 1803–2005: contributions in Parliament by Reginald Applin.

<sup>189</sup> Applin *Across the seven seas*, p. 292.

What was Applin's legacy to the machine gun debate? Applin probably had more influence on his own army because the tactics that he developed at Messines were in fact taken up and used in all major British attacks throughout the rest of the war. Viewed in the round, Applin's legacy was mixed, on the one hand he was the first British army officer to discuss in public the potential of machine guns. Despite his attempts to generate a response to the fact that the German Army was forging ahead of the British in the development of the weapon, his advice was generally ignored. His 1910 book *Machine gun tactics* was ignored by senior officers at the time of publication for no apparent reason; yet he never deviated from his views. He was the first C.M.G.O. appointed in the British Army and to an extent his career suffered when he was posted to America. He was a loss to the sustained development of British machine gun doctrine as his ideas and experience were still valid, but his posting to America demonstrated the value that the British placed on aid from America. In 1917 he was still discussing new and valid ideas in the U.S. which were somewhat lost to the British Army. He was unfortunate that his ideas were ignored in America, but John Henry Parker was afforded the same treatment by his army officers. Applin's contribution to the development of machine gun doctrine was very significant but not as much as Brutinel, Lindsay or Parker. His main contribution was his 1910 book *Machine gun tactics* which brought to the attention of senior officers the latent power of machine guns and the machine gun barrage at the Battle of Messines which became the standard tactic for the British Army. While Applin's role at Messines was significant he had developed his ideas from Brutinel and the Canadian Machine Gun Corps. At that stage of the war (Mid-1917) Brutinel was the driving force of machine gun development in the wider British Army, while Lindsay was only appointed to the Small Arms School in early 1917 which meant that the bulk of his innovations came towards the end of 1917.



Figure 39: Campaign medals of R.V.K. Applin.<sup>190</sup>

Source: D.N.W. Auctioneers [http://www.dnw.co.uk/auction-archive/catalogue-archive/lot.php?auction\\_id=145&lot\\_id=67845](http://www.dnw.co.uk/auction-archive/catalogue-archive/lot.php?auction_id=145&lot_id=67845) (19 November 2014)

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<sup>190</sup> Campaign medals of R.V.K. Applin sold at auction in 2009 by D.N.W. Auctioneers medals from left to right are Distinguished Service Order, V.R., silver-gilt and enamels; The Most Excellent Order of the British Empire, O.B.E. (Military) Officer's 1st type breast badge; Queen's South Africa 1899-1902, 4 clasps, Cape Colony, Orange Free State, Transvaal, South Africa 1901(Capt. R. V. K. Applin, Lanc. Fus.); British War and Victory Medals, with MID oak leaf (Lt. Col. R. V. K. Applin); British North Borneo Company Medal, silver, clasp, Punitive Expedition (R. V. K. Applin, Supt. N.B.C.) D.N.W. Auctioneers [http://www.dnw.co.uk/auction-archive/catalogue-archive/lot.php?auction\\_id=145&lot\\_id=67845](http://www.dnw.co.uk/auction-archive/catalogue-archive/lot.php?auction_id=145&lot_id=67845) (19 November 2014)

## CHAPTER FIVE: RAYMOND BRUTINEL – THE SOURCE OF MACHINE GUN INNOVATION IN THE BRITISH ARMY

Bruty, if you had not done what you have done, I would have had you court martialled. Tell me what are your plans now? – General Byng<sup>1</sup>

### BRUTINEL BEFORE THE WAR

Raymond Brutinel was a French-Canadian officer who became the highest ranking machine gun officer of the Allied Armies during the First World War.<sup>2</sup> He was also the most influential and contributed not only to the Canadian Corps but also the wider British Army. He was unusual in that he had no major military experience prior to 1914. Born in Aude in the South of France in 1882, he joined the French army in 1901 as an eighteen-year-old, and became a senior N.C.O. in the 53<sup>rd</sup> Regiment d'Infanterie de Tarbes. In 1904 he emigrated to Western Canada with his family and settled in Edmonton. His wife was a niece of the future Marshal of France, Ferdinand Foch, and Brutinel was to develop links with Foch during the war. Brutinel in the next ten years worked as a journalist, a geologist and a financial speculator, which allowed him to become a millionaire.<sup>3</sup> By the outbreak of the war had moved to Montreal. Along the way he developed links to Liberal politicians, especially Clifford Sifton whose support he was to use to advance his military career.<sup>4</sup>

In discussing Brutinel and the influence he brought to bear on military innovation it is necessary to assess how he developed his ideas. He had no major military expertise but by his own admission he studied the Russo-Japanese War of 1904-05. From this it would appear that he was inspired by two aspects of Japanese tactics, that is their use of mobile machine guns and the use of machine guns for indirect overhead fire.

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<sup>1</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War', 1914-1918 (C.W.M. Archives, Textual Records, 58A 1195.6), (transcript of interview with Brutinel) tape 16, p. 3.

<sup>2</sup> *London Gazette*, 26 March 1918. Brutinel was promoted to the rank of Brigadier General on 26 March 1916.

<sup>3</sup> Dominique, Jacques, Baylaucq, *Brutinel: the extraordinary story of a French citizen Brigadier- General in the Canadian Army* (Alberta, 2014) pp 12-9.

<sup>4</sup> Tremblay, 'Brutinel: a unique kind of leadership', p. 62. Tremblay's article gives a very good account of Brutinel's background and his rise to prominence in Canada.

I had been a close student of the Russo-Japanese War of 1904 and had been struck with the great fire power of the Machine Gun when employed in sufficient numbers by resolute men, well trained. I deplored the systematic ignorance of the qualities of these weapons shown by the French General Staff and also by the British General Staff, although with the light Vickers machine gun the British had the best machine gun available at the time - and, as far as I know, still unsurpassed.<sup>5</sup>

Yves Tremblay critiqued Brutinel's leadership abilities. Discussing the above comments by Brutinel about the Russo-Japanese War, Tremblay maintains that two contemporary military writers, R. V. K. Applin and Francois de Négrier, who were simultaneously and independently writing about machine guns and infantry doctrine, influenced Brutinel's ideas. However, even though Applin's book *Machine gun tactics* (1910) made references to the Russo-Japanese War, it is unlikely that Brutinel had access to this as outlined in chapter five above. During the First World War, Applin met Brutinel after the Battle of Vimy Ridge when the latter was the senior machine gun officer on the Western Front. At that meeting Applin acknowledged Brutinel's contribution to his ideas, implying that Applin was not the source of Brutinel's ideas. Tremblay also maintained that it was de Négrier's idea of cavalry armed with machine guns which Brutinel developed further. According to Tremblay, de Négrier had noted that the Japanese cavalry had used machine guns as their main weapon to provide fire power.<sup>6</sup> De Négrier acted as a French observer with the Japanese Army during the Russo-Japanese War and published his comments in *Lessons from the Russo-Japanese War* immediately after the war, but it contains no references to machine guns.<sup>7</sup> Given that de Négrier was one of the major French military theorists prior to the war, this reinforces Brutinel's contention that the French ignored the machine gun lessons of the Russo-Japanese conflict. But, it remains unclear whether or not de Négrier could have provided the ideas for Brutinel. However, there were other authors discussing the lessons of the Russo-Japanese conflict. Tremblay makes the mistake of assuming that Brutinel had fully formed his ideas on the outbreak of the war and that the two ideas he was noted for during the war – mobile machine guns and indirect overhead fire – had been conceived before he set off for France in 1914. This was not so. Tremblay links the ideas of Applin and de Négrier to Brutinel at this time, when in

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<sup>5</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 1.

<sup>6</sup> Tremblay, 'Brutinel: a unique kind of leadership', p. 62.

<sup>7</sup> François Oscar de Négrier, *Lessons of the Russo-Japanese war* (London, 1906).

fact it is only later on during the war that Brutinel discusses the ideas of indirect overhead fire, for example.

While it is unclear where Brutinel learned the lessons of the Russo-Japanese War, the fact remains that he took on board observations about tactics based on the conduct of that war. Brutinel seems to have taken the idea of mobility as demonstrated by the Japanese cavalry and matched that with the enhanced fire power of machine guns to come up with the idea of a mobile machine gun unit. He was not in the military on the outbreak of hostilities so he did not have preconceived ideas about how any future conflict would evolve. But when hostilities were declared, he moved immediately to procure machine guns for the French Army.<sup>8</sup> His original idea was to purchase some guns and bring them to France. The concept he had adopted from the Russo-Japanese War was to develop mobile machine guns that could be pushed forward with the attacking troops. The Japanese had equipped their cavalry forces with machine guns: Brutinel took this a stage further and put the machine guns on lorries to make them mobile. These lorries were not to be used as armoured cars but rather as mobile pillboxes armed with machine guns. Brutinel's innovative flair, evident in his business life, thus carried through to his military career.<sup>9</sup>

#### EARLY WAR EXPERIENCE AND THE DEVELOPMENT OF DOCTRINE

On the outbreak of the war Brutinel was still a French reservist and as such was required to re-join the French Army. He encountered travel difficulties while attempting to return to France so he used the time to have some machine guns made to take with him when he was able to travel. He agreed this with the French ambassador in Washington, Mr. Jusserand.<sup>10</sup> He travelled to the Colt's Patent Fire Arms Manufacturing Company of Hartford, Connecticut in Massachusetts and agreed to purchase sixteen Colt machine

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<sup>8</sup> Memo - Organisation of Machine Gun Automobile Brigade, 20 August 1914, (L.A.C., Clifford Sifton papers, c593, 159499-500).

<sup>9</sup> Dominique, Jacques, Baylaucq, *Brutinel: the extraordinary story of a French citizen Brigadier-General in the Canadian Army* (Alberta, 2014) p. 108. Brutinel was a successful businessman in Canada before the war and after the war settled in France where he purchased and ran a bank, Banque- Adam.

<sup>10</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 1.

guns calibrated to the French 7mm round with his own money.<sup>11</sup> One of his political friends, Sir Clifford Sifton, heard what he was attempting to do and came to see him. Sifton urged him to join the Canadian Expeditionary Force instead of the French Army. Brutinel contacted the French Ambassador who raised no objection.<sup>12</sup>



*Brigadier-General Raymond Brutinel as painted by William Logsdall in 1919.*

Figure 40: Brigadier General Raymond Brutinel as painted by William Logsdall.  
Source: Grafton, *The Canadian "Emma Gees"*.

The French subsequently tried to have Brutinel transferred to the French Army, but this was resisted by the Canadian Government and his position was regularised by a presidential decree on 20 April 1915.<sup>13</sup> This issue of Brutinel serving in the Canadian forces during the war was raised again after the war and because his French service record

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<sup>11</sup> Memo - Organisation of Machine Gun Automobile Brigade, 20 August 1914, (L.A.C., Clifford Sifton papers, c593, 159499-500).

<sup>12</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 1.

<sup>13</sup> Ibid.



did not show that he ever passed a Military Revising Council in 1921, he was called up with the conscript class of that year. He duly passed the medical and the matter was closed.<sup>14</sup> The Canadian government was attempting to develop an army from scratch and turned to leaders in the civilian community to help. Brutinel was well known to Sir Clifford Sifton and seemed to have the ideal leadership qualities for the task. In the case of Brutinel, it worked out but not all political appointments were successful and indeed, he sent some temporary officers back to Canada as he felt they were not up to standard. This interaction between Brutinel and Sifton is a case of cultural innovation at play as described by Barry Posen who suggests that civilians working closely with certain military officers can drive innovation in the military. This happened in the case of John Henry Parker and George Lindsay.<sup>15</sup>

Brutinel was appointed a major in the Canadian Army in September 1914 and set about developing ideas on how he would use machine guns. Sifton asked him to write a paper that he could take to the Minister for Militia and Defence, Sir Sam Hughes. Brutinel duly completed this paper outlining the capabilities of machine guns and how he would like to organise a machine gun motorised unit of sixteen guns. This was the number of guns that the Colt Company could produce in three to four weeks. The guns would now be calibrated to the British .303 round.<sup>16</sup> Brutinel completed the paper in a day and presented it on 20 August 1914. Hughes was very enthusiastic and went so far as to double the amount of machine guns from two to four per infantry battalion. He also secured an option to purchase the entire production of the Colt Company.<sup>17</sup> Based on Brutinel's report the Governor General of Canada authorised the establishment of a Motor Machine Gun Corps as part of the Canadian Expeditionary Force on 29 August 1914. The force was to consist of 'sixteen machine guns, eight armoured motor cars, six trucks and four automobile cars for the use of officers.'<sup>18</sup> This new machine gun force was to be styled 'the Automobile Machine Gun Brigade No 1' and the personnel

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<sup>14</sup> *Northern Advocate*, 8 Apr. 1921.

<sup>15</sup> For a full discussion of military cultural innovation see pages 337-42.

<sup>16</sup> Memo - Organisation of Machine Gun Automobile Brigade, 20 August 1914, (L.A.C., Clifford Sifton papers, c593, 159499-500).

<sup>17</sup> Major General Sir Sam Hughes to the Smart Turner Machine Company, 18 September 1915, (L.A.C., Borden papers, MG26-H. 149. C-4363, 79916). The proposal was that the Canadian Government would purchase the plant from the Colt Company and transfer production to Canada.

<sup>18</sup> Fortescue A. Duguid, *Official history of the Canadian Forces in the Great War, 1914-1919, general series vol. 1 from the outbreak of war to the formation of the Canadian Corps, August 1914- September 1915: chronology, appendices, and maps* (Ottawa, 1938), p. 67 (hereafter Duguid, *Official history of the Canadian Forces in the Great War*).

establishment was set at one major, three captains, five subalterns, four sergeants, two sergeant artificers, four corporals, three corporal artificers and 101 privates.<sup>19</sup> The funding for this enterprise was provided by fifteen Canadian citizens who between them donated \$150,000.<sup>20</sup> Brutinel was one of these financiers and he was also appointed the commanding officer of the unit. The speed with which this unit was established was impressive and demonstrated the Canadians' ability to readily accept new ideas and to provide additional resources when the need arose. When it was quickly realised that the unit was too small, an extra forty soldiers were authorised.<sup>21</sup>

The emerging C.E.F. had no logistic support to offer Brutinel, so he took it upon himself to source equipment for his new unit. With this in mind, he selected the Autocar lorry as the mode of transport. It was supplied by the Autocar Company of Ardmore, Pennsylvania and he picked it because of its rugged strength and adaptability. The Autocar Company were delighted to supply Brutinel with the basic truck and Brutinel sourced the armour plating from a local steel mill.<sup>22</sup> The armour plating was tested to be bullet proof at a hundred yards. The cars were a standard civilian vehicle and were adapted to military use by the installation of 9.5mm steel plates on the side as armour. The armour gave all-round protection but it did not provide head cover for the driver nor did it have a vision port in the front plate.<sup>23</sup> However, the cars were not intended to go into battle as fighting vehicles but to act as mere carriers of the two machine guns in each. Twenty Autocars were ordered, eight to be used as machine gun carriers, five were for ammunition and supplies, four were for officer transport, one was used as a fuel carrier, one was used for repairs and the twentieth was donated by the Autocar Company as an ambulance. The Autocars were equipped with two Colt machine guns which were later replaced by Vickers machine guns. Normally, the crew required to serve two machine

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<sup>19</sup> Duguid, *Official history of the Canadian Forces in the Great War*, p. 67.

<sup>20</sup> *Ibid.*, p. 68. Some of the supporters were Sir Andrew Holt, Mr. J.W. McConnell, Sir Vincent Meredith, Mr. Blak, Sir Clifford Sifton and Raymond Brutinel. (L.A.C., Borden papers, MG26-189/X1. C-4386, 104255-104261) Each of the supporters received a letter of thanks from the Canadian Prime Minister Sir Robert Laird Borden who noted that 'the Machine Gun Brigade No. 1 which will add so much to the fighting force of the Canadian Division.'

<sup>21</sup> Duguid, *Official history of the Canadian Forces in the Great War*, p. 67.

<sup>22</sup> Mr. Raymond Brutinel to Autocar Company, 19 August 1914, (L.A.C., Clifford Sifton papers, c593, 159493-6).

<sup>23</sup> Cameron Pulsifer, 'Canada's first armoured unit: Raymond Brutinel and the Canadian Motor Machine Gun Brigades of the First World War' in *Canadian Military History*, x, no. 1 (Winter 2001), p. 46 (hereafter Pulsifer, 'Canada's first armoured unit') gives a detailed account of the design and building of the Autocars in Aug.-Sept. 1914.

guns would be twelve troops, but the Autocars were quite cramped for their intended use and hence could only accommodate three gunners for the two guns plus a driver and an officer. The guns could also be dismounted and used on tripods.<sup>24</sup>

Brutinel was very happy with his choice of motor vehicle but the Autocars were not without faults. It was the best available at the time but was only a civilian conversion and hence did not have off-road capabilities. This was to impede its effectiveness in 1918, when it was used in open warfare on the Western Front. Remarkably of the eight vehicles purchased in 1914 to carry machine guns, five survived the war and two were brought back to Canada.<sup>25</sup> Brutinel showed exceptional organisational ability at this time. It was significant fact that he could design and have a new armoured car built within a month and that these vehicles would survive the rigors of the Western Front for four years.



Figure 41 Autocar Armoured Car in Canadian War Museum  
Source: Authors collection

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<sup>24</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 3. The vehicles were delivered in twenty-seven days and the Colt machine guns had to be transported at night from the factory due to the hostile action of some workers who were of German origin.

<sup>25</sup> Pulsifer, 'Canada's first armoured unit', pp 54-5. The Autocars served throughout the war but were obsolete by 1918. Brutinel called for them to be replaced by a French made 'six-wheel armoured car type designed by Monsieur de Guingan in Paris' but this did not happen before the end of the war. One is on display in the Canadian War museum in Ottawa.

Each car was able to carry 12,000 rounds of ammunition which meant that the brigade could use the full 96,000 rounds in any one action.<sup>26</sup> Brutinel now had a very powerful weapon system at his disposal. The Motor Machine Gun Brigade had the equivalent firepower of a battalion of infantry for less than a tenth of its manpower. He had in mind that this unit would be a mobile force willing to move to any part of the battlefield and deliver an unstoppable amount of firepower. He had married a mobile force, cavalry armed with machine guns, and modern vehicle transport together to form his new unit. Interestingly, he never looked to combine cavalry with his force as he thought the vehicles would be sufficient to complete any tasks assigned. In 1918 he revisited this idea and developed a much larger force which combined cavalry, bicycle troops and motor bikes to have total mobility.<sup>27</sup>

The speed with which the Motor Machine Gun Brigade was established was systematic of the Canadian Expeditionary Force. From the onset of the war Canada's military leaders took a very practical view of organising and equipping a force to send overseas. With little military tradition it was willing to accept help and funding from many benefactors. Williamson Murray discussed military culture and how the culture of an organisation who allow it to innovate. Right from the start the Canadians had an advantage in that they allowed an open culture to evolve. Within that atmosphere Brutinel thrived and was able to develop machine gun doctrine for both the Canadian Corps and the wider British Army.<sup>28</sup>

Once he had the equipment organised, Brutinel turned to the training of his recruits. At the outbreak of the war the Canadian Army was very small. It numbered only 3,110 but did have an additional militia to call upon. There were no machine gun troops in the army or militia and very few machine guns. Brutinel choose the Colt machine gun to arm his unit but was never entirely satisfied with it. The Colt machine gun at that time was generally regarded as obsolete and Brutinel understood that the Colts would be replaced by Vickers machine guns. He quickly trained his own recruits and developed his

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<sup>26</sup> Pulsifer, 'Canada's first armoured unit', pp 54-5.

<sup>27</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project). Appendix iv.

<sup>28</sup> To see how Brutinel influenced British machine gun doctrine see pages 128-34

own training materials which were then used for the rest of the C.E.F.<sup>29</sup> On the outbreak of war Britain expected fully equipped troops to be supplied from her overseas territories for the conflict. The British Army had enough trouble trying to equip its own forces without supplying arms and material to the Canadians. While there would always be some reluctance about ad hoc acceptance of equipment for military purposes, Brutinel was able to supply a fully equipped mobile force which was to prove of value.<sup>30</sup>

Brutinel and the Automobile Machine Gun Brigade No 1 sailed for England in September 1914 and were sent to Salisbury Plain to train. The winter weather of 1914 was appalling and the Canadians suffered badly as they were housed in tents. Brutinel complained about the conditions and the lack of firing ranges at which to train.<sup>31</sup> The lorries of the brigade were mainly employed in the evacuation of the sick to local hospitals. In the spring of 1915 circumstances started to improve and firing ranges were provided in local quarries. Brutinel also became involved in training the other machine gunners of the C.E.F. As the only mobile machine gun unit in the British Army, the C.M.M.G.B. was posted as a mobile guard against a threatened invasion of the English coast in Spring 1915.<sup>32</sup> This duty was performed for a number of months and at least got the troops away from the filthy conditions of Salisbury Plain.

The Canadian Motor Machine Gun Brigade was the first mobile machine gun unit in the British Army and as such did not fit into any divisional structure. After arriving in England, the unit was inspected by the King and senior officers on Salisbury Plain on 4 February 1915. On seeing the armoured cars, the King said to Lord Kitchener in the presence of Brutinel

“This Unit should be very useful I think”. Much to my dismay, Lord Kitchener replied: "I don't think so, Sir, it would unbalance the fire power of a Division. Lieut. General Alderson, then commanding the Canadian Expeditionary Forces, was near me and he heard the brief dialogue. After the inspection he told me gravely: "I am afraid Lord Kitchener is right."<sup>33</sup>

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<sup>29</sup> War diary 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 7 September 1914 – 26 January 1915, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 1914-1919. RG9-III-C-4, R611-157-0-E.4347)

<sup>30</sup> Pulsifer, ‘Canada’s first armoured unit’ p. 46.

<sup>31</sup> War diary 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 7 September 1914 – 26 January 1915, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 1914-1919. RG9-III-C-4, R611-157-0-E.4347)

<sup>32</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 7.

<sup>33</sup> Ibid., p. 46.

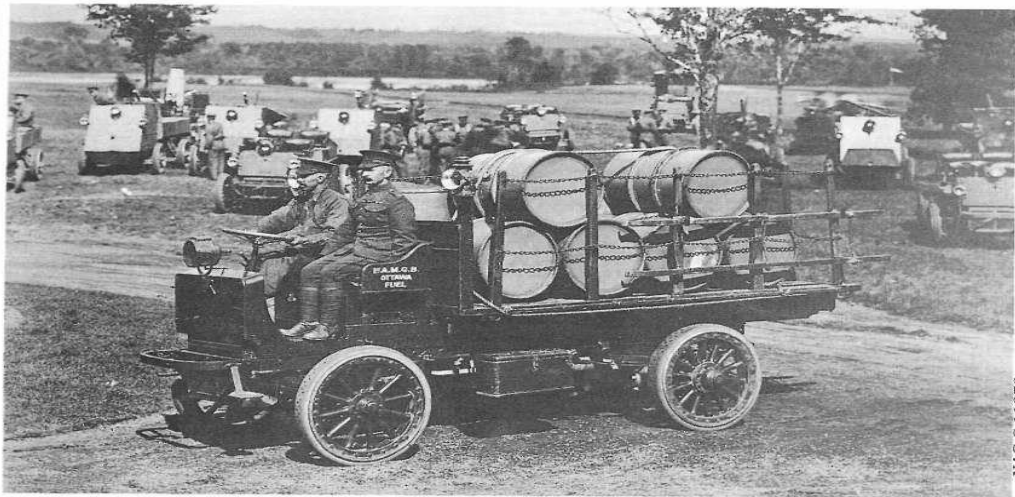
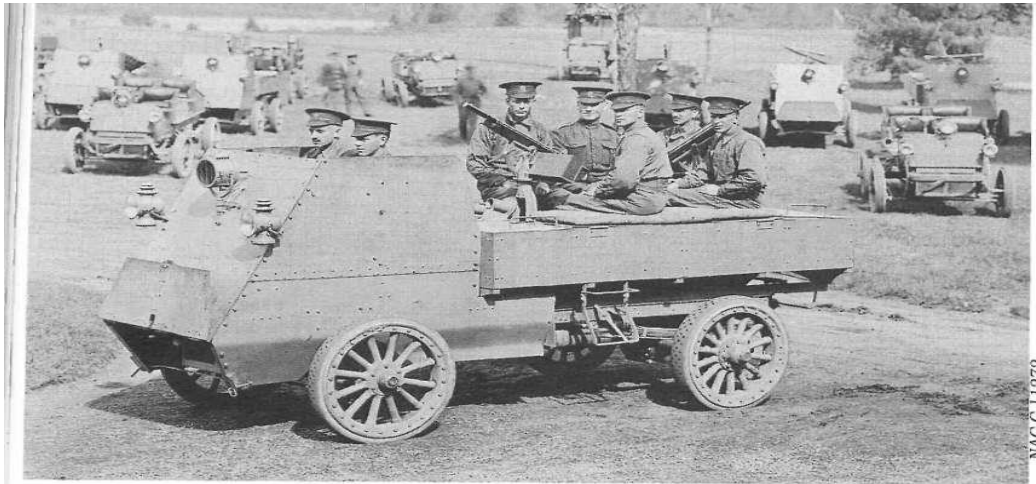


Figure 42: (Top) An armoured Autocar mounting two Colt machine guns with the sides down (middle) an unarmoured Autocar carrying barrels of fuel (bottom) 'A' Battery commander's Autocar  
 Source: Pulsifer, 'Canada's first armoured unit', p. 48.

Brutinel was bitterly disappointed with these comments and saw it as an example of the High Command inertia with regard to new weapons and ideas. He was not satisfied to remain in England with the depot troops and complained to Sir Clifford Sifton whom he asked to use his political influence to have his troops transferred to France. Instead he spent his time training all the machine gunners of the Canadian 1<sup>st</sup> Division.<sup>34</sup> This period in England allowed Brutinel to develop his ideas and catch up on current thinking within the British Army. He was fairly typical of the officers of the C.E.F. whom he described as ‘brim full of intelligent initiative, almost entirely free of red tape and of preconceived ideas, they soon mastered the art of fighting in whatever specialty they were concerned. They were impatient of the conditions under which they were fighting and they began to look for ways and means to break local stalemates and in many ways did so.’<sup>35</sup>

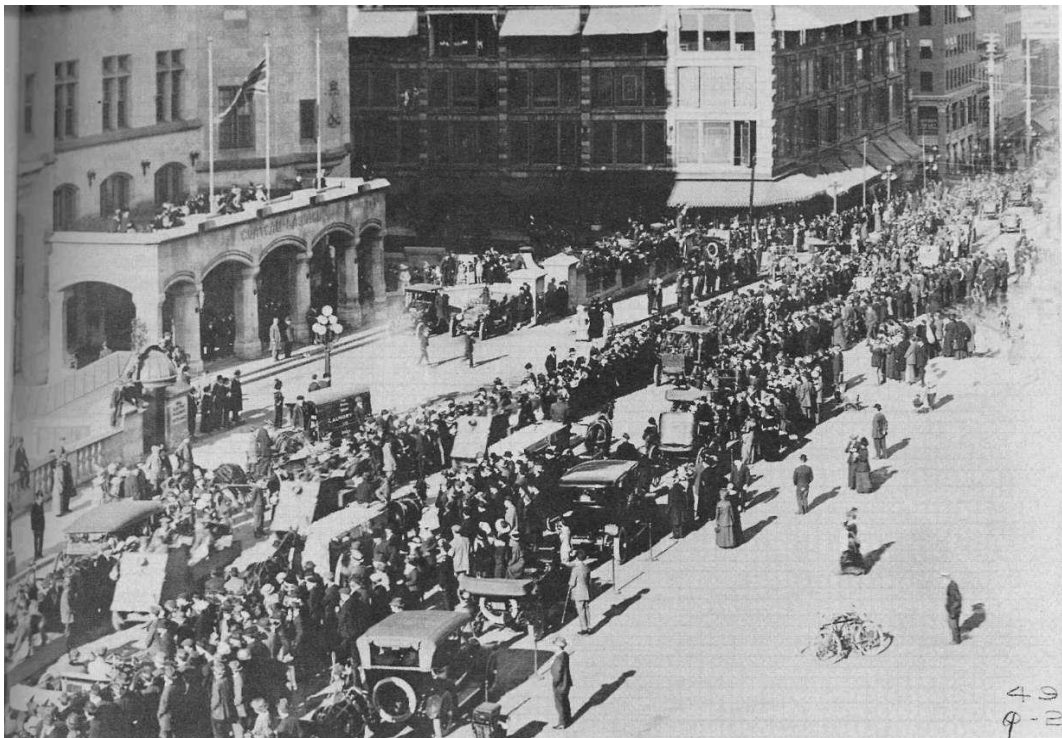


Figure 43: Vehicles of Automobile Machine Gun Brigade outside the Chateau Laurier Hotel, Ottawa, 23 Sept. 1914 prior to being transported to France.

Source: Pulsifer, ‘Canada’s first armoured unit’, p. 49.

<sup>34</sup> Tremblay, ‘Brutinel: a unique kind of leadership’, p. 63. H.T., Logan, M.R. Levey, *History of the Canadian Machine Gun Corps, C.E.F.* (Ottawa, 1919). Hereafter Logan, Levey *History of the Canadian Machine Gun Corps, C.E.F.* p. 49.

<sup>35</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 8.



Most of the articles published to date about Brutinel state that he remained in England until June 1916 but the war diary of the 1<sup>st</sup> Canadian Motor Machine Gun Brigade indicates that he and the brigade were in fact posted to France in June 1915. This error has important implications as it implies that Brutinel and his troops were ignored by senior commanders for a period of over two years. This was not so. While senior commanders struggled to find a task for Brutinel, they did send him to France. The source of this misinformation seems to be the Brutinel tapes, when Brutinel states that ‘the Motor Brigade was relieved from Coast Guard duties in England and ordered to France – landing in Rouen on the 26th of June, 1916’.<sup>36</sup> This date was then taken up by subsequent writers, Yves Tremblay among others. It calls the reliability of Brutinel’s own testimony somewhat into question. When he did arrive in France, the brigade was used as an unofficial anti-aircraft unit, a task that it was not really suited to. Furthermore, the brigade was mobile the trucks were not suited to pursuing aircraft around the country and achieved little success.<sup>37</sup>



Figure 44: Brutinel with his back to the camera, greets the Duke of Connaught during his inspection of the Automobile Machine Gun Brigade at the Rockcliffe Ranges, Ottawa, 23 Sept. 1914.

Source: Pulsifer ‘Canada’s first armoured unit’, p. 46.

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<sup>36</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 10; War diary: 1<sup>st</sup> Canadian Motor Machine Gun Brigade, June 1915 (L.A.C, Canadian Great War Project).

<sup>37</sup> War diary: 1<sup>st</sup> Canadian Motor Machine Gun Brigade, July 1915 (L.A.C, Canadian Great War Project).



When Brutinel and his unit arrived in France, he was told by Lieutenant General Alderson that there was ‘no clear idea regarding future employment of the Machine Gun Brigade and he asked me to familiarise myself with the prevailing conditions and see how it could be employed to advantage.’<sup>38</sup> This demonstrates the unique nature of what Brutinel had conceived. The combatants were only settling down to trench warfare and in the case of the British Army were attempting to absorb new recruits and re-equip. The British High Command had neither the time nor the desire to develop new doctrine for a unit like Brutinel’s. The battles of 1915 and 1916 would be fought with pre-war tactics.<sup>39</sup> This was the situation that Brutinel found himself and he was not alone. The British had also experimented with motor machine gun units on the outbreak of war but merged them into the Machine Gun Corps as mobile troops.<sup>40</sup> They formed part of the Heavy section of the Machine Gun Corps and were the first to be equipped with tanks in 1916. While the British disbanded their equivalent units, Brutinel managed to prevent this happening.<sup>41</sup>

August 1915 found the Brigade positioned at La Bourse in Belgium as divisional support troops. Brutinel started to put into practice certain ideas that he had been developing, some of which worked and some of which were discontinued. He was ordered by General Currie to study the area with the aid of the engineers with a view to locating new strong points and developing them so that the number of front line troops could be reduced. According to Brutinel this study of the ground ‘led us to investigate how long range direct machine gun fire could be usefully employed to support our front area and how indirect fire could be applied if need be.’<sup>42</sup> With the aid of his officers, Captain Wilkins and Captain Scott, both qualified engineers, they produced contour maps on which they worked out the trajectories of machine gun fire. They also produced a clay and plaster relief map of the area. Using this map they realised that from a position about

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<sup>38</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 10.

<sup>39</sup> William Philpott, ‘Beyond the ‘Learning Curve’: The British Army’s Military Transformation in the First World War’ in *Commentary*, 10 November 2009, Europe, History, Land Forces <https://rusi.org/commentary/beyond-learning-curve-british-armys-military-transformation-first-world-war> ( 25 April 2017). William Philpott maintains at the time of the Battle of the Somme it was not so much that the tactical thinking was wrong; more that it was yet to become engrained with the troops, and that the resources to implement it effectively were lacking.

<sup>40</sup> Motor Machine Gun Batteries, Apr. 1915 (T.N.A., 1915, W.O., 158/288).

<sup>41</sup> War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (L.A.C. Canadian Great War Project Appendix I).

<sup>42</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel) tape 11.

500 yards behind their front line, the Germans could use indirect fire on the reverse slopes of “La Hutte” ridge where the infantry reserve of the Brigades in the line were stationed.<sup>43</sup> The Germans never realised this but the Canadian troops were moved from this spot. Brutinel also realised that from some positions behind the Canadian lines, indirect fire could be used to harass the German lines.

An operational order dated 3 August 1915 gave discretion to the local machine gun officers to ‘open fire at night on favourable targets observed during the day, and upon which the guns will be carefully laid by daylight’<sup>44</sup>. It goes on to describe what constituted a legitimate target, trenches where fresh work has been observed, communications trenches and roads and so on ‘Indirect or long range firing’ could be used at the discretion of the local officer but only 50 rounds per gun was authorised. With so little ammunition available it hardly seemed worthwhile but this operational order demonstrated the concepts that Brutinel was starting to develop. Giving discretion to junior officers to choose targets was unique in the British Army at that time, but it showed the confidence that Brutinel had in his troops.<sup>45</sup> In August the C.M.M.G.B. became the machine gun training unit for the C.E.F. in France. Instruction booklets were drafted and a course outline was prepared by Brutinel.<sup>46</sup>

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<sup>43</sup> Ibid.

<sup>44</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug. 1915 (L.A.C., Canadian Great War Project).

<sup>45</sup> Robin Prior and Trevor, Wilson, *Command on the Western Front: the military career of Sir Henry Rawlinson, 1914-1918* (Barnsley, 2004), p. 157. Major General Henry Rawlinson issued tactical notes in May 1916 for the Fourth Army and wrote ‘We must remember that owing to the large expansion of our Army and the heavy casualties in experienced officers, the officers and troops generally do not now possess that military knowledge arising from long and high state of training which enables them to act instinctively and promptly on sound lines in unexpected situations. They have become accustomed to deliberate action based on precise and detailed orders.’ The Long Long Trail, British tactical planning for the start of the Somme offensive, 1916 (<http://www.longlongtrail.co.uk/battles/battles-of-the-western-front-in-france-and-flanders/the-battles-of-the-somme-1916/british-tactical-planning-for-the-start-of-the-somme-offensive-1916/>) (19 July 2016). Chris Baker wrote on his website about the preparations for the Battle of the Somme ‘A GHQ note, issued by Chief of the General Staff Sir Lancelot Kiggell, on 8 May 1916 reminded the Divisions that the officers and men of the New Armies were as yet untried, and that the general quality of the army was not what it had been a year ago. The army could now only react to fixed orders and could not be expected to take appropriate tactical action at a local level’.

<sup>46</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug. 1915 (L.A.C., Canadian Great War Project).



Figure 45: Brutinel, at the left, addresses the Governor-General, the Duke of Connaught during an inspection of the Automobile Machine Gun Brigade, Rockcliffe Ranges, Ottawa, 23 Sept. 1914.

Source: Pulsifer, 'Canada's first armoured unit', p. 46.

Brutinel was very aware that machine gun fire, either direct or indirect, had to be tested for safety and concentration before it could be deployed as a protective barrage in static defence or as a creeping barrage to support attacking infantry. With this in mind the Canadians established a firing range at Camiers on the French coast in Autumn 1915 where they built a shelter on the reverse slopes on a sand dune. They test fired thousands of rounds of ammunition at different ranges and marked the bullet strikes with wooden pegs. Training courses were then developed and shared with all the machine gunners of the Canadian Corps. Brutinel also noted that interest was shown by some British units in the proceedings but unfortunately he does not name them.<sup>47</sup>

Brutinel finally managed to apply his idea of barrage fire in September 1915 when on the night of 23 September, he received an order to

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<sup>47</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6), (transcript of interview with Brutinel), tape 11. Correspondence between Major Baker-Carr, George Lindsay and others, 3 Mar. 1916 (B.T.M., Lindsay Papers E2004.1823.B43). Camiers on the north coast of France near Boulogne became the machine gun training facility in France. It was established by the British Army in June 1916 when the Machine Gun School was moved from Wisques to St Cecile Plage, near Camiers. It was used by all the machine gunners of the British Army. It proved an ideal site as it was situated among miles of sand dunes which allowed the fall of machine gun rounds to be easily spotted.

bring all your guns into action during hours of darkness, nights of 23/24 and 24/25 on roads and trenches used by the enemy, leading from rear to trenches opposite our front from trenches 123 to 136. Fire to be intermittent, but every line of communication should, if possible, be swept by a burst of fire during each quarter of an hour of darkness.<sup>48</sup>

This time the ammunition allocation was 20,000 rounds per gun. Sixteen guns were used for the operation with four in reserve. Brutinel reported that the operation was a success with only minor casualties caused by faulty ammunition. Five of the guns were put out of action due to ammunition jamming.<sup>49</sup> Ultimately, however, this attack proved that the concept could work. Brutinel was satisfied that this attack on the Messines road helped demonstrate to the infantry that overhead indirect fire was safe and useful.<sup>50</sup>

Brutinel tried another novel tactic in December 1915 when he used one of his Autocars to tow an 18-pounder gun to the front lines to shell a German forward post on the Messines road. During the night of 14 December an artillery piece was hitched to the back of an Autocar and pulled forward into position. The gun fired a few rounds during the night and was then towed back out of range of counter battery fire. The target was destroyed and the attack was deemed a success but was not repeated as the Autocars proved too difficult to move due to the road conditions.<sup>51</sup> Normally artillery was moved by horsepower, but this operation showed the willingness of the Canadians to use motor vehicles as part of a tentative step towards all arms warfare.

While officially on leave, Brutinel took responsibility for reinforcing the front line with his machine gunners against a German attack. In June 1916, the C.M.M.G.B. was in reserve and Brutinel was given twelve days leave. However, this was cut short when a German attack was made on Mount Sorrel in the Ypres salient on 2 June 1916. Under the heaviest bombardment suffered by the Canadians to date in the war, the Germans broke through the Canadian 3<sup>rd</sup> Division front line trenches.<sup>52</sup> The situation was critical and

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<sup>48</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug.-Sept. 1915 (L.A.C., Canadian Great War Project).

<sup>49</sup> Ibid.

<sup>50</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 12.

<sup>51</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug.-Dec. 1915 (L.A.C., Canadian Great War Project). The divisional commander sent a message congratulating Brutinel and his men on 'the brilliant success of last night's enterprise which reflects the highest credit on all concerned in it'.

<sup>52</sup> G.W.L., Nicholson, *Official history of the Canadian Army in the First World War: Canadian Expeditionary Force, 1914-1919* (Ottawa, 1962), p. 148. (hereafter Nicholson, *Official history of the Canadian Army*).

Ypres was threatened. Brutinel made his way to the headquarters of the 2<sup>nd</sup> Canadian Brigade and suggested to General Lipset that the C.M.M.G.B. could plug the gap in the lines.<sup>53</sup> The war diary of the 1<sup>st</sup> Canadian Division states that the C.M.M.G.B. was ordered to the front to occupy 'B' emplacements at 7:00pm on the 2 June.<sup>54</sup> Brutinel sought and received permission to recall personnel and guns from anti-aircraft duty at divisional headquarters.<sup>55</sup> Nine guns and crews arrived in position at 9:35pm and a further two at 10:10pm.<sup>56</sup> The C.M.M.G.B. succeeded in establishing a new line helping to stop the German attack and at 8:45 p.m. General Byng issued orders 'that all ground lost to-day will be retaken tonight'.<sup>57</sup> The following day the first counter attack failed and the men reformed on the line established by the C.M.M.G.B and began to dig in.<sup>58</sup> Covering fire was provided by Brutinel as part of the assault but was not sufficient to achieve victory.<sup>59</sup> Brutinel was then ordered 'to return guns to Divisional Reserve at 1<sup>st</sup> opportunity' and he duly returned the guns to billets that evening.<sup>60</sup> The fighting over the next few days was very intense and confused but Brutinel had reacted very quickly to the situation. His actions were recognised when he was awarded a D.S.O.<sup>61</sup> Brutinel was summoned after the battle by General Sir Julian Byng, G.O.C. Canadian Corps, to account for his actions. Byng was impressed by Brutinel and at the end of the interview Brutinel mentioned that he still had an unused leave warrant. Byng immediately endorsed it and Brutinel travelled to the south of France to spend time with his family.<sup>62</sup>

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<sup>53</sup> Brigadier General Lipset to General Officer Commanding, 1<sup>st</sup> Canadian Division, Report on operations of the 2<sup>nd</sup> Canadian Infantry Brigade in the Ypres Salient from June 2<sup>nd</sup> to June 14<sup>th</sup> 1916, War diary, 2<sup>nd</sup> Canadian Infantry Brigade, June 1916 (L.A.C., Canadian Great War Project). Lipset's report noted that Colonel Brutinel arrived at the Brigade headquarters with the C.M.M.G.B. at 6.30 pm.

<sup>54</sup> War diary: 1<sup>st</sup> Canadian Division, June. 1916 (L.A.C. Canadian Great War Project) Appendix 8 p. 3.

<sup>55</sup> Ibid., Appendix 8 p. 6.

<sup>56</sup> Ibid., Appendix 8 pp 6-7.

<sup>57</sup> Nicholson, *Official history of the Canadian Army* p. 150.

<sup>58</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 16.

<sup>59</sup> Brigadier General Lipset to General Officer Commanding, 1<sup>st</sup> Canadian Division, Report on operations of the 2<sup>nd</sup> Canadian Infantry Brigade in the Ypres Salient from June 2<sup>nd</sup> to June 14<sup>th</sup> 1916, War diary, 2<sup>nd</sup> Canadian Infantry Brigade, June 1916 (L.A.C., Canadian Great War Project).

<sup>60</sup> War diary, 1<sup>st</sup> Canadian Division, June 1916 (L.A.C. Canadian Great War Project) Appendix 8 p. 13.

<sup>61</sup> *London Gazette*, 3 June 1916.

<sup>62</sup> Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 16. National Personnel Records Centre, (L.A.C. National Personnel Records Centre, Raymond Brutinel file) Brutinel service record mentions that Brutinel was granted two weeks leave after the battle which corresponds to this account of his meeting with Byng.

This action by Brutinel marked him out as an officer of the highest calibre and an innovator who should be listened to. He showed resolve and initiative in the use of his mobile machine gunners which brought him to the attention of senior commanders. His theories on machine gun doctrine would now reach a wider audience and potentially greater acceptance. In August 1916, Brutinel and the C.M.M.G.B. were transferred to the Second Army for special duty.<sup>63</sup> On the back of this work, Brutinel received a letter of thanks for his role in developing a machine gun defence of Cassel during August 1916 from General Sir Herbert Plumer, G.O.C. Second Army.<sup>64</sup>

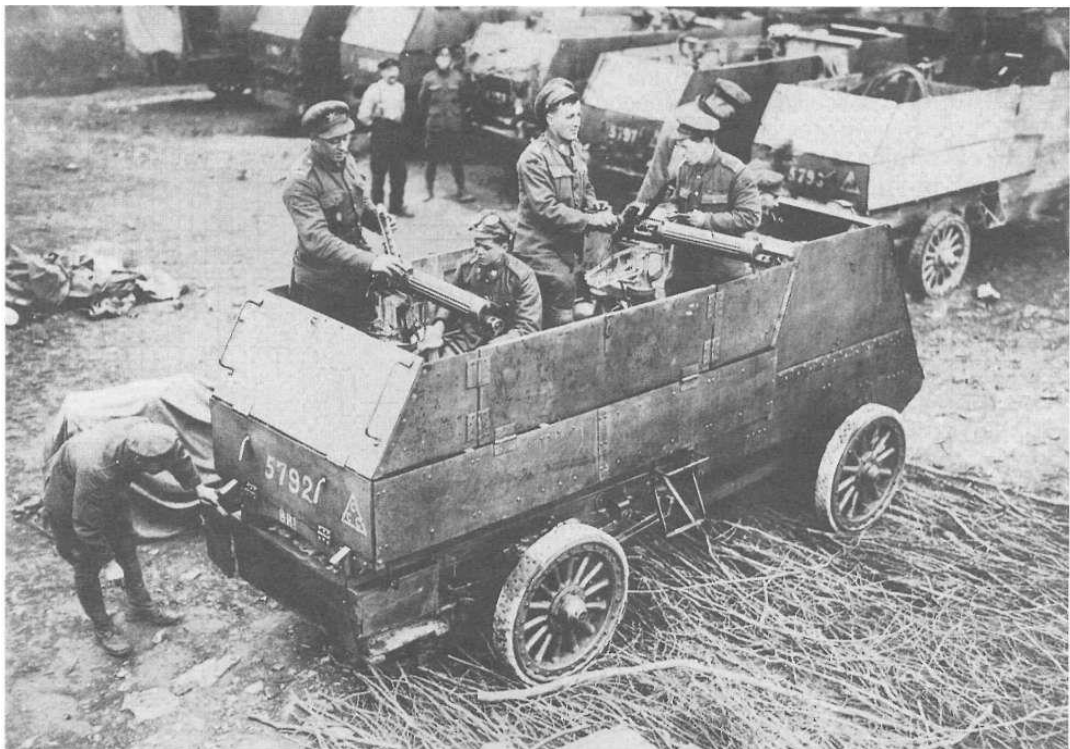


Figure 46: Autocar armed with Vickers machine guns.  
Source: Library and Archives Canada.

To win back ground recently lost to the Germans on 2 June 1916, Brutinel applied to the General Staff of the 1<sup>st</sup> Canadian Division for permission to use indirect fire against the trenches opposite his positions. In order to cover an attack, he proposed to enfilade the German trenches with indirect fire. He worked out that the line of fire would be applied

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<sup>63</sup> Letter General Plumer to Lieutenant Colonel Brutinel, 15 August 1915, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 4, File 5)

<sup>64</sup>Ibid.

parallel to the line of attack with the result that the advancing troops would be covered to within fifty yards of the German trenches.<sup>65</sup> He was aware that the timing of the barrage would have to be agreed with the brigade commanders.<sup>66</sup> This action allowed Brutinel to experiment with his ideas and to test them. It also showed how the Canadians were trying to use all weapons systems as offensive weapons and not just sit on the defensive. He seemed to have the support of his superiors who recognised his ability and ideas. This would stand him in good stead in the future. In the first year that Brutinel and the C.M.M.G.B. were stationed in France, they performed various support tasks as they struggled to find a defined frontline role. At times they fought as conventional machine gunners, at others they used their mobility to hunt aircraft and zeppelins. In August 1916 they were even used as a guard for a visit of King George V to the front.<sup>67</sup> They were of course hampered in their mobile role due to the deadlock of the Western Front but always sought to develop new tactics.<sup>68</sup>

Brutinel was about to hand over direct command of the C.M.M.G.B. and take a more formalised role in the development of Canadian machine gun doctrine. All of his good work was rewarded when he was appointed Corps Machine Gun Officer in October 1916. Now he was officially the most senior machine gun officer in the Canadian Army and also more importantly he was the most senior machine gun officer in the British service at the time. The duties of a Corps Machine Gun Officer were defined as follows

- a. To assist Divisional and Brigade commanders, when required, in matters connected with machine guns and their employment in offensive and defensive operations.
- b. To assist in the tactical training of Machine Gun Companies out of the line, to inspect Machine Gun Companies in the line.
- c. To ensure that a sound doctrine regarding the principles of handling machine guns is spread throughout the infantry, by means of lectures and classes for Officers of Machine Gun Companies at Corps or Divisional Schools of instruction.
- d. To watch, on behalf of the Corps Commander, the special interests of the Machine Gun personnel as regards promotion and appointments (Authority – C.B. /407, d/25-9-16).

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<sup>65</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, June 1916 (L.A.C. Canadian Great War Project, appendix lxiv).

<sup>66</sup> Ibid.

<sup>67</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, August 1916 (L.A.C. Canadian Great War Project).

<sup>68</sup> War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Aug.-Dec. 1915 (L.A.C., Canadian Great War Project).

- e. In the event of operations the Corps Machine Gun Officer will exercise executive command over such Machine Gun units of the Corps as may be placed under his orders by the Corps Commander for the purpose.<sup>69</sup>

Now he had the authority and rank to implement ideas that he had developed since arriving in France. It is not known if there were other candidates for the post but it was quite clear that Brutinel was deemed the ideal choice.<sup>70</sup> His appointment to this position was clearly helped by his service to date. He had shown that he was an officer of skill and enterprise and was willing to try new ideas in an effort to break the deadlock of the trenches. As part of his appointment he was sent on a fourteen-day course: the first week was at the Lewis Gun School, Le Toquet and the second week was at the Machine Gun Training Centre, Grantham.<sup>71</sup> It is interesting to note that while he was deemed the 'machine gun expert,' he was still required to attend training courses in his chosen area.

One of the first tasks that Brutinel faced was the establishment of a fourth machine gun company for each division. This was to further enhance the number of machine guns available to each division. Up until that time each machine gun company had been attached to a particular infantry brigade and fought alongside them at all times. This created a problem regarding training and the replacements of casualties in the front line. It was recognised that a fourth divisional machine gun company was required. This would create a divisional reserve of machine guns under the direct control of the divisional commander and also provide for proper period of rest and allow for training to be developed. Henceforth, machine gun companies would become used to being attached to different infantry brigades at different times while at the same time developing the necessary tactical skills. In December 1916 four new machine gun companies were created in the Canadian Corps and Brutinel was made responsible for their training and equipping.

The logical extension of this decision to create additional machine gun companies was to follow the example of the British Army and create a Canadian Machine Gun Corps (C.M.G.C.). Brutinel submitted a report detailing his reasons for this to the

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<sup>69</sup> War diary, Machine Gun Officer Canadian Corps, Nov.1916-June 1917 (L.A.C. Canadian Great War Project, Appendix A).

<sup>70</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2).

<sup>71</sup> War diary, Machine Gun Officer Canadian Corps, Nov.1916-June 1917 (L.A.C. Canadian Great War Project, Appendix A).



Canadian General Staff in November 1916.<sup>72</sup> In the report he claimed that ‘the failure to provide earlier the necessary organisation has resulted in the disintegration of the Machine Gun Depot, with the resulting lack of trained drafts and lack of trained officers.’<sup>73</sup> He also mentioned the practice that had developed whereby trained machine gun officers were transferred back to their original regiments when a promotion became available with the resulting loss of their experience to the machine gun service. Also, wounded machine gunners who recovered were being returned to infantry regiments which Brutinel considered a waste of a valuable resource. Looking to the future, Brutinel anticipated that the fighting in 1917 would be ‘severe’ and that the absence of a separate Canadian Machine Gun Corps would restrict the number of trained machine gunners available to replace ‘wastage’. He predicted he would need 300 machine gunners and twenty-five officers per month as replacements.<sup>74</sup> He wanted to use the training facilities of the M.G.T.C. in Grantham but remain administratively separate from the British service. A preliminary troop complement for the new service was set at 191 officers and 3,478 other ranks.<sup>75</sup> The bulk of the troops were already contained in the sixteen machine gun companies of the four Canadian divisions. An organisation chart for the C.M.G.C. is shown in figure 47. This is based on the organisation in 1918 when the C.M.G.C. had grown to its full capacity.

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<sup>72</sup> War diary, Machine Gun Officer Canadian Corps, Nov.1916-June 1917 (L.A.C. Canadian Great War Project, Appendix L. The Machine Gun Corps had been established in the British Army in Oct. 1915 and had streamlined the training of men and officers.

<sup>73</sup> Ibid..

<sup>74</sup> Ibid.

<sup>75</sup> Ibid.

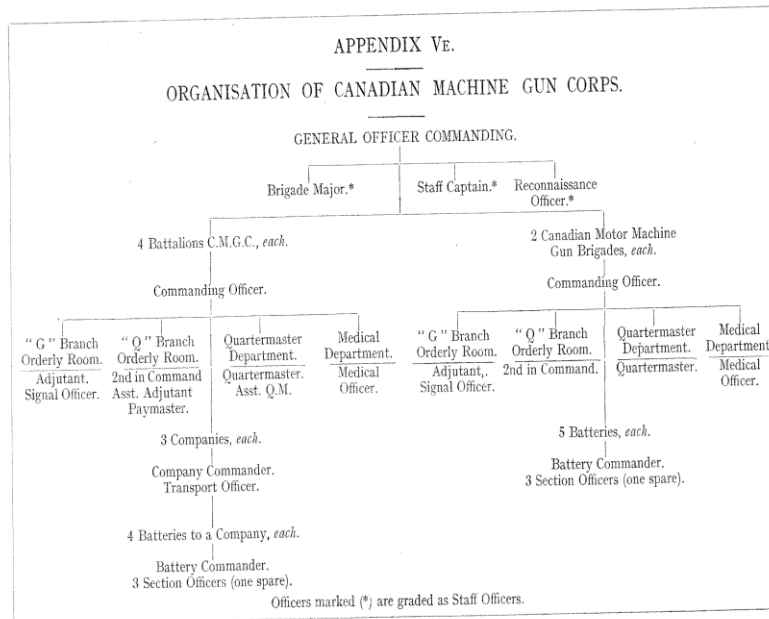


Figure 47: Organisation chart of the Canadian Machine Gun Corps  
 Source: *Report of the Ministry Overseas Military Forces of Canada 1918* (London, 1918), p. 290.

The Canadians were very much focussed on fighting as a separate unit within the British Army. This was a political decision. The Canadian Corps had grown in size to be the equivalent of a British army and as a result was now required to develop the correct organisational structure.<sup>76</sup> The decision to establish a separate machine gun corps for the Canadians was part of this process. Brutinel also wanted to control the organisation as he was not satisfied with the use of machine guns within the British Army. He was happy

<sup>76</sup> Tim Cook, *Shock troops: Canadians fighting the Great War, 1917-1918, volume two*, p. 372-3. According to Tim Cook in early 1918, the British War Office began to assert pressure on the Canadian government to establish a Canadian Army of two corps in order to strengthen the depleted B.E.F. At the time, the C.E.F. had four full strength divisions in France and the 5<sup>th</sup> Canadian Division in England. The British proposal was to reduce the divisions from twelve battalions to nine battalions and therefore have two corps with three divisions of nine battalions.<sup>76</sup> This would have meant a promotion for Currie making him the only dominion-born army commander in the B.E.F. but he turned down this proposal. Currie felt that this would reduce the striking power of the Canadian Corps by diluting the experienced officer cadre. This refusal to expand the Canadian Corps was resented by some Canadian officers who saw their promotional prospects dented. Some Canadians applauded Currie as they saw this as an attempt to break up the Canadian Corps.

enough to use some of British facilities, like the Machine Gun Training School at Grantham but wanted at the same time to retain a degree of control and independence.<sup>77</sup>

Lieutenant General Byng accepted Brutinel's recommendation and on 15 January 1917 forwarded it to the commander of the First Army with the following comment

The situation of the machine gun companies serving with the Canadian Corps, as regards the supply of personnel, conditions of service and protection is highly unsatisfactory and has resulted in extravagance, inefficiency and discontent. To remedy this serious state of things the creation of a Canadian Machine Gun Corps should be undertaken forthwith, and I attach the greatest importance to this step being taken without delay.<sup>78</sup>

Brutinel's proposal was acted upon and officially the Canadian Machine Gun Corps was established in April 1917.<sup>79</sup> The Canadian Machine Gun Corps was the only separate machine gun organisation allowed alongside the Machine Gun Corps during the war. All other national constituents used the Machine Gun Corps for the training and development of machine gun doctrine. The development of a separate machine gun unit allowed the Canadians and Brutinel to develop their own doctrine as they saw fit. This leeway would manifest itself in the Battle of Vimy Ridge, the planning of which began on 23 December 1916.

As part of this development Brutinel travelled to England in January 1917 to reorganise the machine gun base depot. He realised that this was imposing a constraint on the numbers of trained machine gunners arriving in France and he was determined to resolve this issue. Brutinel recognised that the motor machine gunners and cavalry machine gunners required specialist training. With this in mind, he made arrangements for the cavalry machine gunners to attend the British cavalry machine gun school at Uckfield. He proposed that ten officers and 200 other ranks would attend the British machine gun training facility at Bisley as replacements for the motor branch.<sup>80</sup> Brutinel was willing to use the M.G.T.C. at Grantham for training purposes. He believed that the Canadian Corps could not duplicate Grantham in its scale and range of facilities, so he agreed to send his troops to be trained there. A further development was to establish a

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<sup>77</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E.2004.1995.C.37)

<sup>78</sup> Ibid., War diary, Machine Gun Officer Canadian Corps, Nov.1916-June 1917 (L.A.C. Canadian Great War Project, Appendix M.)

<sup>79</sup> Ibid.

<sup>80</sup> Ibid., Appendix N.

base depot in Camiers, to receive, administer and forward all drafts to the machine guns units as they arrived in France.<sup>81</sup> The establishment of the base depots was a crucial intervention which demonstrated Brutinel's rare mix of organisational and tactical skills which made him an outstanding commander of the C.M.G.C.

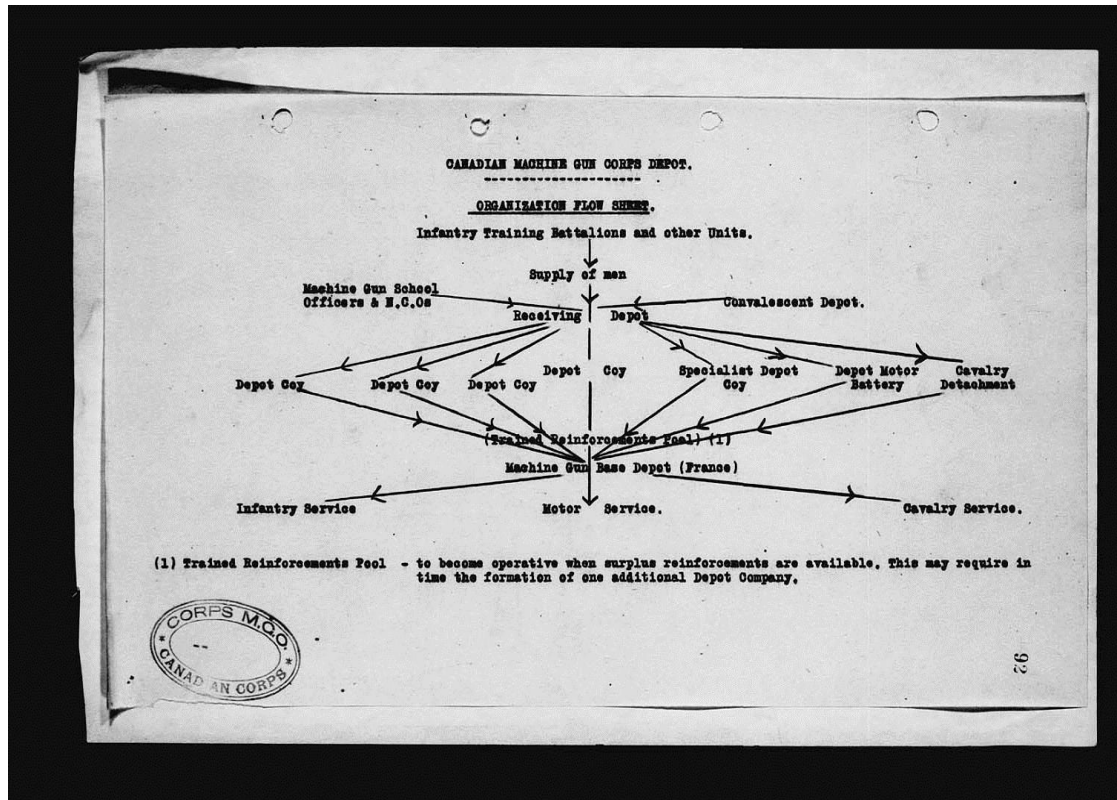


Figure 48: Organisation flow chart of Brutinel's scheme for the Canadian Machine Gun Corps Depot.

Source: War diary Machine Gun Officer Canadian Corps, Nov.1916-June 1917 (Canadian Great War Project, Appendix N).

The adoption by the C.E.F. of a separate Machine Gun Corps structure was completed about a year after the British Army had done so. There had been no necessity for the Canadians to do it earlier as the Canadian Corps up to that point was quite small and only grew to four divisions in late 1916. The C.M.G.C. was quite small in comparison to its British equivalent, but it did have some differences, the most significant being the size of its motor units. Brutinel was always aware of this and was willing to allow it. He still harboured hopes of a return to mobile warfare, when the mobile guns

<sup>81</sup> Ibid., Appendix P.

would show their worth. In support of this he was able to point to the action in June 1916 at Ypres when the C.M.M.G.B. rushed to the front to stem a German outbreak.<sup>82</sup>

## BATTLE OF VIMY RIDGE AND THE ROLE OF MACHINE GUNS

The Canadian Corps was ordered to take control of the German-held high ground along the Vimy Ridge in France. This battle was to be part of a bigger offensive and as such had a clear objective, which was to capture and dominate the high ground overlooking the Douai Plain.<sup>83</sup> The attack was set for April 1917 and preparations began in December 1916. General Byng of the Canadian Corps had some set ideas about the offensive and as part of the planning sent some senior officers, led by Major General Arthur Currie and accompanied by Brutinel to discuss with the French, lessons that had been learned at Verdun.<sup>84</sup> According to Brutinel, the French had developed 'battle groups' consisting of ten to eighteen men equipped as follows '1 light Machine Gun, 1 or 2 automatic rifles, 2 rifle bombers (B.V.D.s), 2 Grenadiers throwing hand grenades, and a few bayonet men who were also acting as ammunition carriers.'<sup>85</sup> The French Army used heavy machine guns and 75mm artillery pieces to secure the flanks of the 'battle groups' and co-ordination between the units was closely watched by NCOs.<sup>86</sup> According to Brutinel

As soon as I returned to the Corps Headquarters, Sir Julian called a Conference of Divisional Commanders to hear my report and my verbal remarks. Major General Lipset undertook to try to adapt our rifles to fire Mills grenades more or less modified. The Lewis machine gun was found to answer all requirements and the organisation of the Machine Gun Corps could tactically meet the needs of the Battle Groups.<sup>87</sup>

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<sup>82</sup> Nicholson, *Official history of the Canadian Army* p. 150.

<sup>83</sup> Nicholson, *Official history of the Canadian Army* p 245.

<sup>84</sup> Patrick, Brennan, 'Julian Byng and leadership in the Canadian Corps' in Geoffrey Hayes, Andrew Iarocci and Mike Bechthold (eds), *Vimy Ridge: a Canadian reassessment* (Ontario, 2007), pp 94, 102. Brennan mentions three Canadian officers who were Major General Currie, Lieutenant Colonel Andrew McNaughton and a British Officer, Major Alan Brooke, who would lead the Canadian Corps artillery at Vimy Ridge. The war diary of the 1<sup>st</sup> Canadian Division mentions Currie and Major Hammick an artillery officer. No mention is made of Brutinel who reveals in his audio tapes that he was instructed by Byng and Currie to attend the French briefings.

<sup>85</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 18.

<sup>86</sup> *Ibid.*

<sup>87</sup> *Ibid.*

The fact that all other accounts of the preparations for the battle reference Currie having delivered lectures about lessons learned by the French at Verdun<sup>88</sup> is significant as it casts doubts on the reliability of Brutinel's account from his audio tapes. Given that the tapes were produced in the 1960s when Brutinel was in his eighties, it is reasonable to conclude that his memory may not have been clear. Certainly, Brutinel was part of the discussions of these new tactics but no evidence exists to show that he travelled to meet the French at Verdun. However, this does not lessen in any way his contribution to the Battle of Vimy Ridge. Some writers have questioned Brutinel's account as a witness and have queried his motives. Yves Tremblay has remarked that Brutinel was prone to exaggeration when in notable company, but yet he recognised Brutinel's immense contribution to the war effort.<sup>89</sup> Tremblay also mentions that Brutinel would point out how often Currie consulted him and that he was not shy about mentioning to his mentors, Sifton and Hughes in Canada and Byng and Currie in France, that the Canadian war effort would be better served if only people listened to him.<sup>90</sup> This type of behaviour alienated some of his fellow officers.<sup>91</sup> The lessons from Verdun were taken on board by the Canadians and infantry tactics were reformed, the importance of artillery was recognised and machine guns were accepted as a key component for delivering harassing fire. Brutinel had played the major role in getting machine guns recognised as offensive weapons in the Canadian Corps.<sup>92</sup>

According to the war diary of the Canadian Machine Gun Corps, planning for the Battle of Vimy Ridge began for Brutinel in December 1916. Because of the performance of machine gun units to date in the war, the newly formed C.M.G.C. was to assume a greater role in the battle. This was conveyed to Brutinel by Lieutenant General Byng when he ordered 'proposals for machine gun covering and barrage fire on the front of the Corps be submitted.'<sup>93</sup> The experience of the Somme meant that new tactics should be tried in the British Army. Brutinel and his innovative use of machine guns was recognised as worthy of repeating on a large

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<sup>88</sup> War diary: 1<sup>st</sup> Canadian Division General Staff, 1 Jan. 1917-31 Jan. 1918 (L.A.C. Canadian Great War Project) and Nicholson, *Official history of the Canadian Army*, p. 250.

<sup>89</sup> Tremblay, 'Brutinel: a unique kind of leadership', p. 59.

<sup>90</sup> *Ibid.*, p. 59.

<sup>91</sup> *Ibid.*, p. 59. One of the officers Brutinel had a difference of opinion with was Colonel Andrew McNaughton who discounted the value of machine guns in favour of artillery. This personal dispute was to carry on for years after the war.

<sup>92</sup> Nicholson, *Official history of the Canadian Army* pp 249-50.

<sup>93</sup> Grafton, *The Canadian "Emma Gees"*, p. 59.

scale by General Byng who was willing to allow Brutinel a relatively free rein. Now for the first time machine guns would be placed at the forefront of the attack.

Machine guns and the enhanced firepower that they brought to bear would be used in an offensive capacity in a major battle. Machine guns on their own could not bring about victory, but once integrated with new infantry and artillery tactics they would play an important role. The preparation for the Battle of Vimy Ridge involved a new approach. Detailed planning was undertaken which along with technical and tactical innovations and extensive training for the Canadian Corps would lead to a major victory on the Western Front.<sup>94</sup>

After the battle Brutinel produced a 'Report of operations leading to capture of Vimy Ridge'. He outlined in great detail the preparations he undertook before the battle and the machine gun actions in the battle. Building on the lessons learned by the French at Verdun, artillery preparation was reformed and machine gun practice was integrated into the overall assault plan. There were four phases to this overall preparation

- a. The employment of machine guns for harassing fire previous to Zero day.
- b. The employment of machine guns for supporting fire during the attack, and the establishment of defensive barrage for each definite phase of the operation.
- c. The employment of guns detailed to advance with the assaulting brigades.
- d. The employment of guns in the consolidation and holding of ground after its capture.<sup>95</sup>

Harassing fire began thirty days before Zero day and was designed to deny the Germans the opportunity to repair broken wire. Brutinel worked closely with the artillery units, whose primary aim was the destruction of wire, trenches and fortifications. At night, the machine guns were employed to rake over gaps in wire and enfilade the communication trenches with overhead fire. The result of this harassing fire was that the Germans could not carry out any repairs or troop reliefs. Eventually this led to the downgrading of their ability to conduct a viable defence. According to Brutinel, an unnamed French General who was shown the machine gun plans during an inspection in the days prior to the attack

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<sup>94</sup> Nicholson, *Official history of the Canadian Army* pp 249-50.

<sup>95</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

was impressed and commented ‘This is new, it looks interesting, and I request that we should be informed of the results obtained’.<sup>96</sup> Brutinel was summoned to General Sir Julian Byng and asked to make a full report on the machine guns immediately after the attack for the French authorities. Brutinel replied that a report should be compiled of German prisoners’ comments. This was completed as ordered.<sup>97</sup> The intelligence reports from captured German prisoners testified to the following impact of the machine gun fire

- a. by night, machine gun fire made it difficult to repair the trenches knocked down by day by the artillery fire.
- b. the bringing in of the supplies was hampered greatly and was practically impossible during the last few days because of the density of indirect machine gun fire.
- c. the evacuation of wounded was increasingly difficult and almost impossible during the last three nights before the attack.
- d. the intense machine gun fire made it impossible to man the parapets when the attack started.<sup>98</sup>

Among the lessons learned about harassing fire was an appreciation for the necessity for close coordination between the artillery, intelligence and machine gun services to achieve the best results. Brutinel believed that he had achieved this coordination between the services and pushed for it to be adopted in future attacks. However, not everything went according to plan and eight days before Zero day, there was a reduction in the amount of machine gun fire achieved. This was due to worn out machine gun barrels which allowed the Germans to resupply the front lines overland. Brutinel was furious, convinced that a huge opportunity was missed.<sup>99</sup> There was an operational order dated 2 April 1917 from

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<sup>96</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 19.

<sup>97</sup> Ibid. A documentary commissioned by the National Film Board of Canada about the Battle of Vimy Ridge mentioned the role Brutinel and the interest shown by the French in these new machine gun tactics: see The Battle for Vimy Ridge part 5 – Keys to victory <https://www.youtube.com/watch?v=gw3A9H2IP6E> (2 Apr. 2015).

<sup>98</sup> Ibid., p. 2. Lieutenant General Arthur Currie, G.O.C Canadian Corps to Lieutenant Colonel Raymond Brutinel, 10 November 1917 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Currie noted the work of the machine gunners during the Battle of Passchendaele and wrote to Brutinel to convey his thanks. He also mentioned that ‘all prisoners have testified to the great losses caused to the enemy by our machine gun fire, while our own infantry are loud in their praises as to the support rendered by our machine gunners.’ Lessons learnt [sic] from Messines – Wytchaete operations – machine guns, 1917 (T.N.A., W.O., 158/298) and War diary, 4th Machine Gun Company A.I.F., June 1917 (Australian War Memorial, AWM4, 24/9/12). After action reports collected by 4<sup>th</sup> Machine Gun Company, A.I.F. and the X Corps from the Battle of Messines record German prisoners comments about the effect of machine guns on their ability to fight.

<sup>99</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).



Brigadier General Radcliffe of the Canadian General Staff directing a renewed effort to maintain the machine gun barrage on the German communications trenches.<sup>100</sup> Brutinel named this harassing fire ‘area shooting’ and described it as ‘the sudden application of a very heavy burst of fire by a large number of machine guns on a restricted area (say 6 machine guns firing one belt rapid fire on an area 200 yards by 200 yards)’.<sup>101</sup> The term ‘barrage fire’ had not yet been coined.



Figure 49: Canadian machine gun squad at Vimy Ridge.  
Source: George Metcalf Archival Collection.

Stage two of the plan called for the employment of machine guns for supporting fire during the attack, and the establishment of a defensive barrage for each definite phase of the operation. Based on the experience of the Somme, it was realised that once the enemy trenches had been taken, the advancing infantry were vulnerable to German counter attacks.<sup>102</sup> The Germans had developed an elastic defence whereby they allowed the front line trenches to be lightly defended and would depend on swift counter attacks to recapture lost ground. Brutinel recognised that the attacking infantry would require help to beat off these attacks.<sup>103</sup> One way of counteracting the German tactic was to employ

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<sup>100</sup> Ibid., Appendix I.

<sup>101</sup> Ibid., Appendix K.

<sup>102</sup> Ibid.

<sup>103</sup> Ibid.

machine guns in the role of light artillery by using them to create a defensive barrage.<sup>104</sup> This required a large amount of guns pre-sited and ready to fire at different stages of attack. The advancing infantry were now armed with the Lewis light machine gun which made the heavier Vickers machine guns available for this barrage fire. Vimy Ridge was one of the most heavily defended positions on the Western Front.<sup>105</sup> However, due to the difficulty of attacking Vimy Ridge, it was decided that a continuous defensive barrage was required along the whole ridge instead of waiting for S.O.S signals to put down a barrage. This was a huge undertaking and required an immense amount of guns and ammunition to be available. Brutinel had 358 machine guns available for the overall attack on Vimy Ridge and allocated 150 of them for barrage fire. This amount of guns allowed one machine gun for every fifty yards of front.<sup>106</sup> Additional troops on loan from the infantry battalions were allocated to the machine guns as ammunition carriers but as soon as the battalions started to incur casualties, they looked to have the troops transferred back. This created administrative difficulties when tracking the troops and the solution was to increase the size of the machine gun companies by forty troops.<sup>107</sup>

Phases three and four of the operational plan dictated that the machine guns would move forward with the advancing troops and once in position would be used to hold the captured ground. The moving of heavy Vickers machine guns over a battleground was not easy and the war diaries of the various units note some of the problems encountered. Depending on the objectives of the various units the machine guns were to be moved at different times, varying from zero hour to zero hour plus two. One section of the 8<sup>th</sup> Canadian Machine Gun Company under the command of Lieutenant Morgan actually reached its final objective before the infantry and inflicted up to 100 casualties on a group of retreating Germans.<sup>108</sup> However, some of the machine gunners in the first wave suffered heavy casualties, so a fine balance had to be struck between having the guns available for defence and not having the guns destroyed. Brutinel concluded that the Vickers machine guns were not suitable to advance with the first waves and the Lewis

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<sup>104</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

<sup>105</sup> Nicholson, *Official history of the Canadian Army* pp 245-6.

<sup>106</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

<sup>107</sup> Ibid.

<sup>108</sup> Ibid.

light machine guns should be used for that purpose.<sup>109</sup> The Vickers was heavy and most importantly could not be fired on the move. Also Brutinel made the observation that the Vickers could be used more efficiently to consolidate ground or cover gaps and protect flanks of units if they remained under the control of battalion commanders or brigadiers. Pushing them too far forward too quickly diverted them from direct command and potentially made them less significant. This was a major concern to senior commanders and was a problem that was not easily solved. It was important to arrange the machine guns in depth so that they could deliver fire in the close support category, as flanking fire and to cover one another's position.<sup>110</sup>

One of the hallmarks of the Battle of Vimy Ridge was the preparation the Canadians were required to complete. General Byng believed in rigorous drill and the whole corps underwent systematic training behind the front lines. A full scale replica of the ridge was laid out with taped off areas for the German trenches and flags marking strong points and obstacles. The area was adapted using aerial photographs and reports by airborne observers. While in reserve all troops were required to train over the mock battlefield with a rolling barrage simulated by mounted officers bearing flags and moving forward at the required pace.<sup>111</sup> Machine gunners were no different and Brutinel insisted that they carry out similar tasks. All of his troops had to know when and where they were meant to be on the battlefield and they were expected to continue without the assistance of officers if necessary.<sup>112</sup> Some of the machine guns were detailed as 'mobile guns'. These were attached to the brigades and conducted close training with the infantry in the weeks prior to the battle.

Brutinel had the 358 machine guns available for the attack organised as follows:

16 Canadian Machine Gun Companies	256
4 British Machine Gun Companies (British 5 <sup>th</sup> Division)	64
1 <sup>st</sup> Canadian Motor Machine Gun Brigade	38
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Total	358 <sup>113</sup>
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<sup>109</sup> Ibid.

<sup>110</sup> Ibid.

<sup>111</sup> Nicholson, *Official history of the Canadian Army* pp 249-50.

<sup>112</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

<sup>113</sup> Ibid.

104 of the guns were detailed to the attacking infantry, twenty-four guns were held as a Corps reserve and the balance were used in the machine gun barrage.

On the morning of the attack, the massed fire of 150 machine guns was used to aid the advance of the infantry. Firing over the heads of the infantry, it was aimed 400 yards in advance of the troops and moved forward as the infantry attacked. The official history of the Canadian forces described it as unprecedented in military history and it was the heaviest fired to date in the war.<sup>114</sup> It was planned that 1,408,000 rounds of ammunition would be required to sustain the supporting barrage for the 1<sup>st</sup> Canadian Division on day one and 500,000 rounds for each 24 hour period thereafter. The corresponding amounts were 1,568,000 and 800,000 for the 2<sup>nd</sup> Canadian Division. The 3<sup>rd</sup> and 4<sup>th</sup> Canadian Divisions would require 1,000,000 each, on day one and 600,000 thereafter. The total ammunition requirement for day one was 4,976,000 rounds of S.A.A.<sup>115</sup> This requirement was a huge logistical undertaking for the C.M.G.C. Most of this ammunition was man handled into the front lines in the weeks prior to the attack by the gunners. The targets were chosen by the divisions before to the battle depending on their tactical considerations and there was some leeway allowed to switch to secondary targets if necessary. However, the final barrage was commanded and dictated by Brutinel.<sup>116</sup> The logistic effort for a battle such as Vimy Ridge was immense and demonstrated the long lead-in time required. There was a four-month planning and training period necessary for the battle.<sup>117</sup> This type of effort demonstrates the constraints that the combatants operated under during the war. For an attack to be successful, huge resources had to be accumulated and this alone would not guarantee success. While the battle plan and tactics were innovative for Vimy Ridge, they were not easy to implement.

The battle commenced on 9 April 1917 and within thirty minutes the German front line trenches had been taken. By the end of the first day most of the objectives had been reached apart from Hill 145 which was captured on 12 April 1917. The operation was judged to be a huge success, the single most successful Allied advance on the Western Front to that date. The Germans did not launch their customary counter attacks

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<sup>114</sup> Nicholson, *Official history of the Canadian Army* p. 253.

<sup>115</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

<sup>116</sup> Grafton, *The Canadian "Emma Gees"*, pp 66-72. For a detailed portrait of the battle and the part played by the machine guns see *ibid*.

<sup>117</sup> Nicholson, *Official history of the Canadian Army* pp 247-9

and retreated to new lines further east onto the Douai plain. These new lines were far enough from the ridge to deny the Canadians effective observation of the German lines and to a certain extent offset the benefits of the victory. The use of machine guns at this stage of the battle was deemed a success but it was not without its faults. There were problems with communications back to the guns and the use of visual signals generally did not work effectively. This was due in part to enemy artillery fire and it was decided not to use it in the future. Reports by front line troops showed large numbers of German casualties caused by these defensive barrages and in one instance Germans fleeing an artillery barrage had unknowingly walked into the machine gun barrage.<sup>118</sup> Overall the Canadian Corps suffered 10,602 casualties of which 3,598 were killed.<sup>119</sup> The total casualties for the machine gun units were nine officers and 19 members of other ranks killed.<sup>120</sup> The Canadians were the first to integrate machine guns into a major attack. It was an accumulation of experience gained and built on the limited objective of only capturing the ridge played to its strengths. There was no breakout phase, which suited the tactics of the machine gun.

The use of machine guns at Vimy Ridge as organised by Brutinel was pioneering and played no small part in the victory. He had used his extensive experience and was quite willing to adapt his tactics based on lessons learned from the Somme and Verdun. Critically important was the combination of machine guns with new artillery tactics and the liaison with other arms. Combined tactics were still a long way off, but it was a start and should be recognised as such. Machine guns would not win the war on their own, but in future would play a major part in contributing to final victory. Machine guns had come of age as an offensive weapon and the success of the Canadians had been noted within the wider British Army. Brutinel and the headquarters of the C.M.C.G. would now play host to visits by officers from the other Allied contingents.<sup>121</sup> Based on the experience of Vimy Ridge new tactics were adopted and taught. Brutinel's appointment as a C.M.G.O. meant that he now had the authority to command respect and resources which further

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<sup>118</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project, Appendix K).

<sup>119</sup> Grafton, *The Canadian "Emma Gees"*, p. 73.

<sup>120</sup> *Ibid.*

<sup>121</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E.2004.1995.C37). Brutinel states that he hosted visits from at least eighteen Corps Machine Gun Officers to his headquarters after the Battle of Vimy Ridge.

generated success. Brutinel's ideas became part of the mainstream British doctrine and this is explored in the chapter on Lindsay and Applin.

#### LEARNING THE LESSONS OF VIMY RIDGE AND THEIR DISSEMINATION AMONG ALLIED ARMIES – HORIZONTAL INNOVATION

The victory at Vimy Ridge and the part played by Brutinel and his machine guns meant that his theories became very topical. He was now seen as the major innovator of machine gun tactics and staff officers came to hear him talk about his ideas. It has already been mentioned that the French had become interested in the use of machine guns for indirect fire during the Battle of Vimy Ridge. On 2 July 1917 Brutinel followed up on this when he visited the French Army at Compiègne to meet with staff officers.<sup>122</sup> During the month of July 1917 he delivered a lecture entitled 'Organisation of machine gun barrages, tactical employment of machine guns, command and control, tactical organisation of machine guns for battle' to a group of officers at the machine gun school in Camiers. The officers consisted of British general officers from G.H.Q., Corps commanders and the Brigadier General-General Staff or chief of staff. There was also a group of French officers in attendance.<sup>123</sup> On 24 July 1917 he lectured at the 1<sup>st</sup> Army School on the 'tactical employment of machine guns' to a group of American officers.<sup>124</sup> This visit showed the effect Brutinel's work was having beyond the Canadian Corps. Brutinel continued his lectures in August 1917 and he received a visit from a Captain Hurteau of the 156<sup>th</sup> Regiment, French Army who stayed for two days to receive instructions in the use of machine gun barrages.<sup>125</sup> He also delivered a lecture to a group of First Army artillery officers on the use of machine guns for artillery work.<sup>126</sup> One of the most senior officers to visit Brutinel was Brigadier General H.R. Cumming, commander of the Machine Gun Training Centre at Grantham who arrived in November 1917 to discuss

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<sup>122</sup> War diary, Machine Gun Officer Canadian Corps, July 1917 (L.A.C. Canadian Great War Project).

<sup>123</sup> War diary, Machine Gun Officer Canadian Corps, July 1917 (L.A.C. Canadian Great War Project).

<sup>124</sup> Ibid.

<sup>125</sup> Ibid., Aug. 1917 (L.A.C. Canadian Great War Project).

<sup>126</sup> Ibid.

machine gun training.<sup>127</sup> Just after Vimy Ridge, Brutinel received a visit from Colonel R.V.K. Applin, newly appointed Corps Machine Gun Officer of the IIA.N.Z.A.C. Applin was planning for the Battle of Messines and asked especially to meet Brutinel at Vimy.<sup>128</sup> These visits demonstrate the interest that Brutinel and his new tactics generated.



Figure 50: Raymond Brutinel, here as a Lieutenant Colonel, with French officers.  
Source: Bovington Tank Museum.

After Vimy Ridge, the Canadians were allowed a period of rest and this allowed Brutinel to further refine his ideas. One of the small innovations that he introduced was the holding of monthly meetings of the First Army D.M.G.O.s. He was now expanding his role of machine gun innovator outside the Canadian Corps into the wider audience of the British Army.<sup>129</sup> These conferences were attended by as many company commanders as could

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<sup>127</sup> Ibid., Nov. 1917 (L.A.C. Canadian Great War Project). Cumming was commander of the M.G.T.C. at Grantham from Aug. 1917 until Feb. 1918. Cumming believed in the unified tactical control of machine guns and played a part in the re-organisation of machine guns into battalions under divisional control, a reform which was put into place in the spring of 1918. Hanway R., Cumming, *A Brigadier in France 1917-1918* (London, 1922) p. 90.

<sup>128</sup> Applin, 'Lecture on the machine guns at the Battle of Messines' p. 32.

<sup>129</sup> Ibid., Aug. 1917 (L.A.C. Canadian Great War Project). There is a note in the war diary, noting that the 'G.O.C. Canadian Corps has kindly consented to spare the services of Lieutenant Colonel Brutinel, Canadian Machine Gun Corps Officer for the purpose of presiding at these conferences.'

attend and were to consider 'any new development in the tactical employment of machine guns, the best methods of training to keep abreast with these developments and questions related to the personnel, material and instruction of the machine gun companies.'<sup>130</sup> The first meeting was held on 25 August 1917 and discussed such issues as the training of machine gun officers in observation and fire direction. The recommendation was that the 'sniping batteries' in the line would provide this training. Also clarity was sought as to the duties of a D.M.G.O.<sup>131</sup> This recommendation led to the next point of discussion for the D.G.M.O.s when they observed 'now that there are no Corps Machine Gun Officers, it appears to be of great importance that Divisional Machine Gun Officers should co-operate with machine gun defence with flanking divisions in the line and should arrange for combined machine gun action.'<sup>132</sup> The outcome of the discussion was recorded thus: 'that the co-ordination of the employment of machine guns, like all other arms, belongs to the General Staff. The D.M.G.O.s are at their disposal to co-ordinate machine gun defence and arrange combined machine gun action.'<sup>133</sup> The D.G.M.O. was a relatively new post and the officers were learning on the job. It was a post that took a while to be embedded into the divisional structure. As yet they did not command troops in their own right but were there in an advisory role. Another matter discussed at this conference was the overhead clearance required for indirect fire. It was stated that the clearance being used was excessive which limited the ability to hit the target. New tables were due to be issued which would allow some leeway for consultation with brigade commanders and taking into account the state of the barrels, the training of gunners and the accuracy of maps.<sup>134</sup> These conferences were of major importance as they allowed the machine gun officers to discuss and agree new tactics and operational procedures under the leadership of Brutinel. These conferences were a classic example of the development of doctrine. The successful battle experience of the Canadians at Vimy Ridge was being studied and discussed by British machine gun officers and as a result was finding its way into both new tactics and training manuals. The prime example of this is the role played by

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<sup>130</sup> Ibid., Appendix 7A.

<sup>131</sup> Ibid., Appendix 9.

<sup>132</sup> War diary, Machine Gun Officer Canadian Corps, July 1917 (L.A.C. Canadian Great War Project). Appendix 9.

<sup>133</sup> Ibid.

<sup>134</sup> Ibid.



machine guns in the Battle of Messines under the guidance of R.V.K. Applin who developed his ideas after visiting Brutinel.<sup>135</sup>

Around this period, the Canadian Machine Gun Corps started to produce a monthly magazine *The Canadian Machine Gunner* from its base in Seaford in the UK.<sup>136</sup> It contained articles on tactics, official notices, sports events and social events. The editors encouraged contributions from soldiers from the front and it also published a monthly article by retired Major F.V. Longstaff based on his book *The book of the machine gun*. It was distributed to all officers and N.C.O.s within the corps and was an important way to disseminate new doctrine and building an esprit de corps.<sup>137</sup>

The initiative of holding machine gun conferences is important in that it demonstrates the acceptance of these new machine gun tactics by the wider British Army. It was a prime example of Brutinel bringing innovative business ideas to the art of war which were readily accepted in the Canadian Corps. Brutinel reported on these conferences in monthly reports which he submitted to the General Staff of the Canadian Corps. These conferences and resulting reports heralded the start of the development of new machine gun doctrine as they sought to introduce best practice across the divisions of the Corps.<sup>138</sup> Gary Sheffield notes that Dominion forces were at the forefront of dissemination of new doctrine during this period. He noted how a Canadian Corps ‘after action report’ containing a number of tactical tips was distributed to seven corps.<sup>139</sup> This he concludes demonstrates that the Canadian Corps was a key driver in the development of doctrine across the B.E.F. and that there was a constant flow of information both formal and informal between the different formations.<sup>140</sup>

When Brutinel was interviewed in 1963 he was asked if he thought that the success of the machine guns at Vimy Ridge had any influence on British and French

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<sup>135</sup> Applin, ‘Lecture on the machine guns at the Battle of Messines’ pp 32-33.

<sup>136</sup> *The Canadian Machine Gunner*. Seaford, UK: Canadian Machine Gun Corps., 1918 (C.W.M. Archives, PER UA 602 C3 C363).

<sup>137</sup> Ibid.

<sup>138</sup> War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (L.A.C. Canadian Great War Project, Appendix 5). The Jan. 1918 meeting of D.M.G.Os. was attended by twelve officers of the British 1<sup>st</sup> Army from 1<sup>st</sup> Portuguese Division, 46<sup>th</sup> Division, 1<sup>st</sup> Canadian Division, 2<sup>nd</sup> Canadian Division, 3<sup>rd</sup> Canadian Division, 4<sup>th</sup> Canadian Division, 11<sup>th</sup> Division, 31<sup>st</sup> Division, 42<sup>nd</sup> Division, 62<sup>nd</sup> Division. Some of the topics that they dealt with were the issues of tracer bullets and armour piercing bullets for use against aircraft and a new belt filling machine.

<sup>139</sup> Gary, Sheffield, ‘How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918’ in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000). p. 126.

<sup>140</sup> Ibid.

thinking, to which he replied strongly in the affirmative. Brutinel was in his eighties when he made the radio tapes, so some of the dates that he quotes are slightly inaccurate but the fact remains that most of his claims are backed up by other evidence.<sup>141</sup> He was writing about these issues officially during the war and his claims made sense. He described a visit he made to Chalon sur Marne to lecture a group of French officers. General Fayolle attended some of the lectures and he was so impressed with the content that he ensured that staff officers from the Ministry de la Guerre and the Ministry of Armaments should attend the next lecture.<sup>142</sup> At the end of the conference, General Fayolle ordered tests for barrage fire to be carried out by at his Machine Gun School under the command of Captain de Grammont Lesparre.<sup>143</sup> General Fayolle was satisfied with the results and, according to Brutinel, 'the French Army was now convinced. Several Machine Gun Schools were organised.<sup>144</sup> The necessary hand books were written, printed and distributed within three months.'<sup>145</sup> This episode demonstrates the high regard that Brutinel was held in. Normally a recommendation that the French Army would change their machine gun from an officer in the British Army would be met with categorical refusal, but in this case as Brutinel was French, it was easier to accept.<sup>146</sup> Currie

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<sup>141</sup> Brutinel never wrote a memoir but recorded thirty-two audio tapes. The bulk of his claims have been substantiated in the body of the text of the thesis. His account of the Battle of Vimy Ridge tallies with the official war diaries (see chapter on the Battle of Vimy Ridge), his work with the British Army on machine gun doctrine has been confirmed in contemporary correspondence with Lindsay (see chapter on Lindsay), the discussions about converting machine gunners to infantrymen in Apr. 1918 were agreed with entries in his diaries (see chapter on Brutinel in 1918). Only on one account can his memory be questioned when he stated that his unit landed in France in June 1916 whereas his war diary recorded that the unit arrived in France in June 1915.

<sup>142</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 20, p. 1. General Fayolle was then in command of a group of armies and was shortly promoted to the rank of Marshal of France which would put the date at mid-1917. Logan, Levey *History of the Canadian Machine Gun Corps, C.E.F.* p 148. Logan and Levey mention this visit by Brutinel to the French G.H.Q. and his meeting with General Fayolle.

<sup>143</sup> Training file, (L.A.C., Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 395) Capitaine de Grammont Lesparre was a reserve captain in the 117th Infantry Regiment and former director of the Mitrailieuses School of the 4th Army. Brutinel kept up correspondence with Capitaine de Grammont and wrote to him on 8 Sept. 1917 attaching a machine gun intelligence report on the Canadian Corps attack on Hill 70 in Aug. 1917.

<sup>144</sup> Logan, Levey *History of the Canadian Machine Gun Corps, C.E.F.* p 148.

<sup>145</sup> Training file, (L.A.C., Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 395) Brutinel's training file contains the original French training manuals which were written by de Grammont. They date from February and April 1917.

<sup>146</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 35. Applin states that on 20 Aug. 1917 a French Moroccan division launched an attack on the banks of the Meuse under the cover of a machine gun barrage.

acknowledged the major role that Brutinel played in assisting the French Army in a letter to Canadian G.H.Q. in March 1918.<sup>147</sup>

Brutinel as C.M.G.O. was responsible for the training of Canadian machine gunners and part of the arrangement was to send new recruits to the British machine gun schools. This was in accordance with policy when the C.M.G.C. was established in early 1917. Brutinel at the time stated that ‘the methods of training drafts developed by the British Machine Gun Corps are with some difference of detail perfectly adaptable to the requirements of the Canadian Machine Gun Service and it is recommended that they should be adopted.’<sup>148</sup> However, he was not always happy with the teaching delivered and according to his memoir he started to receive a number of complaints. Canadian officers and N.C.O.s returning from the courses complained that the courses were a waste of time and that some of the British instructors made disparaging remarks about Canadian troops.<sup>149</sup> Concerned about the difference in machine gun doctrine being taught and the problems this caused, Brutinel approached General Currie. The latter was sufficiently concerned about the matter and mentioned it to Lieutenant General Sir Henry Horne, commander of the 1<sup>st</sup> Army, who apparently took such a dim view of the incidents that he drove to Haig’s H.Q. Haig stated that he had heard similar reports from other sources and asked whether the Canadian Machine Gun Corps could supply a new curriculum for the British Machine Gun Schools.<sup>150</sup> Brutinel describes what happened next:

Thanks to my staff, Major G. Forster, Capt, Lawson and Lieuts. Mortimer Backer and Hume, the projects asked for were prepared and submitted within 24 hours, together with a list of British Officers competent and able to reorganise the Machine Gun Schools. I insisted that these Officers should be able not only to

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<sup>147</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2).

<sup>148</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1916-June 1917 (L.A.C. Canadian Great War Project).

<sup>149</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 21; Letter from Brutinel on employment of M.G.’s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E.2004.1995.C.37).

<sup>150</sup> Australian War Memorial, RCDIG0000623, Monash Papers, 3 Sept.-9 Oct. 1917. Correspondence in the files of the 3<sup>rd</sup> Australian Division during Sept. 1917 note that an incidence occurred which called into question the quality of the machine gun training of Australians at the Machine Gun School in Grantham. The D.M.G.O. of the 3<sup>rd</sup> Australian Division, Major J.M. Wells complained to his divisional commander Major General J. Monash that twenty-five machine gunners of the 23th Machine Gun Company who arrived as replacements in France and in his opinion were not properly trained. Monash contacted Major General J.W. McCay in charge of the A.I.F. depots in Britain who made inquiries at Grantham and came back to say that they had been correctly trained and certified. McCay pointed out that apparently there was some bad feeling between Major Wells and the officer in Grantham, Major Sexton but that also the gunners in question might have been faking ignorance to avoid been sent to the front.

work out the details of progressive courses for Machine Gunners but should also be able to lecture intelligently to the Infantry Commanders and other Arms. These suggestions were adopted without delay by the Commander in Chief who selected Brigadier General Ironsides to supervise the reorganisation approved. This appointment, in my mind, appeared justified by the fact that General Ironsides had been G.S.O.1. of the 4th Canadian Division and was presumably conversant with the Canadian Corps Machine Gun doctrines.<sup>151</sup>

Brutinel had corresponded with Lindsay in September 1917 about problems that he observed at Grantham. He claimed that staff at Grantham had ignored his work on indirect fire and it was not 'until March 1917 when under pressure originated by my Corps through official channels some steps were taken to generalise the new methods in the British Army.'<sup>152</sup> He also noted that some of his officers were reluctant to go to Grantham because of comments made to them.<sup>153</sup> Based on this piece of evidence, it was clear that the Canadians had an influence on British machine gun doctrine. This is further proof of Brutinel's wider influence on the war effort. He was able to recognise the problem and had the authority to resolve it quickly. The problem was not that some Canadian troops had to listen to disparaging remarks but rather that there was a difference in machine gun doctrine. The difference seemed to lie in the fact that some sections of the British Army did not yet appreciate the value of barrage fire. Unfortunately, Brutinel's testament is not dated, so it difficult to place this episode into a time scale. However, it ties in with the visit of Brigadier General H.R. Cumming to Brutinel in November 1917 to discuss machine gun training and also with the appointment of General Ironsides to command the Small Arms School at Camiers in January 1918.<sup>154</sup> At this stage, Brutinel was a senior commander in the Canadian Corps and had the authority to control machine gun doctrine.

The training of machine gunners was always a key component of Brutinel's work and the Machine Gun School at Camiers was where he delivered most of his lectures and tested some of his theories about machine gun fire. The setting was ideal for machine gun work as the fall of shot could be easily spotted on the hard sand. On 6 July 1917 Brutinel

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<sup>151</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 21.

<sup>152</sup> Letter from Brutinel on employment of M.G.'s for indirect fire, 2 Sept. 1917 (B.T.M., Lindsay Papers E.2004.1995.C37).

<sup>153</sup> Ibid.

<sup>154</sup> War diary, Machine Gun Officer Canadian Corps, Nov. 1917 (L.A.C. Canadian Great War Project). Edmund Ironsides was appointed commandant of the Small Arms School, with the temporary rank of colonel between 7 Jan. 1918 and 26 Mar. 1918 at Camiers.

along with the Canadian Corps commander, General Currie, and the B.G.G.S. attended a demonstration of a machine gun creeping barrage by 'A' battery of the 1<sup>st</sup> C.M.M.G.B. at Camiers. This feat was repeated on 8 July 1917 for Prince Arthur of Connaught, the Canadian Governor General.<sup>155</sup> On 23 July 1917 he delivered a lecture to a group of over a hundred General Staff officers entitled 'Organisation of machine gun barrages, tactical employment of machine guns, command and control, tactical organisation of MG units for battle'.<sup>156</sup> After the lecture there was a demonstration of barrage fire carried out by the Canadians.

Brutinel continued to lecture and the titles of these lectures offer a revealing insight into his priorities in developing machine gun doctrine. From figure 51 it can be seen that from July 1917 Brutinel regularly gave lectures to various units on machine gun doctrine. Over time these expanded from the discussion of mere machine gun tactics to the development of combined tactics with infantry. He also lectured artillery officers on the use of machine guns as light artillery. This is clear proof of the development of his tactical thinking during this period. Brutinel never produced a book on machine gun doctrine in his own name but there is a reference in his war diaries in September 1917 to a meeting in the Small Arms School at Camiers he attended, where he discussed the writing of a manual.<sup>157</sup>

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<sup>155</sup> Ibid., July 1917 (L.A.C. Canadian Great War Project).

<sup>156</sup> Ibid.

<sup>157</sup> Ibid., Sept. 1917 (L.A.C. Canadian Great War Project).

Date	Title of lecture	Place of lecture	Attended by
18/07/1917	<i>Development of machine gun tactics</i>	Camiers	French Officers
23/07/1917	<i>Organisation of machine gun barrages, tactical employment of machine guns, command and control, tactical organisation of MG units for battle</i>	Camiers	French Officers, General officers from G.H.Q., B.E.F., Corps Commanders & B.G.G.S
24/07/1917	<i>Tactical employment of machine guns</i>	I Army Headquarters - Aire	American officers
26/07/1917	<i>Co-operation of infantry and machine guns</i>	Canadian Corps School	
03/08/1917	<i>Firing at aircraft with machine guns and Lewis guns</i>	Camblain L'Abbe	9th Canadian Infantry Brigade
04/08/1917	<i>Use of machine guns as light artillery</i>	I Army Headquarters - Aire	Artillery Officers
17/08/1917	<i>Use of machine guns for artillery work</i>	I Army Headquarters - Aire	Artillery Officers
22/08/1917	<i>Co-operation of infantry and machine guns</i>	Canadian Corps School	
06/12/1917	<i>Co-operation of machine gun with all arms</i>	Machine Gun Wing - Canadian Corps School	
17/12/1917	<i>Anti-aircraft work machine guns</i>	8th Canadian Infantry Brigade	8th Canadian Infantry Brigade
05/01/1918	<i>Organisation of machine guns companies with battalions</i>	Small Arms School - Camiers	Staff officers
21/01/1918	<i>Co-operation with all arms</i>	Machine Gun Wing - Canadian Corps School	French Officers
26/01/1918	<i>Machine Gun barrage and organisation</i>	Machine Gun Wing - Canadian Corps School	
07/03/1918	<i>New battalion formation</i>	Machine Gun Wing - Canadian Corps School	
15/03/1918	<i>Organisation and administration of new machine gun battalion</i>	Machine Gun Wing - Canadian Corps School	
20/03/1918	<i>Responsibilities of W.Os in machine gun battalions</i>	Machine Gun Wing - Canadian Corps School	

Figure 51: Lecture topics delivered by Brutinel.

Source: War diary, Machine Gun Officer Canadian Corps, July 1917-Mar. 1918.

In December 1917 one of the most prominent British machine gunners, Lieutenant Colonel George M. Lindsay, visited Brutinel to discuss the machine gun operations at the recent Battle of Cambrai.<sup>158</sup> It was a highly significant meeting. (At Cambrai new tactics were deployed, one of which was the mass use of tanks and without an artillery bombardment. Surprise was complete and a breach was made in the German lines but within days German counterattacks had reversed the victory.) It is unclear what the two men discussed, but at the time Brutinel was developing ideas about 'all arms warfare' combining infantry, artillery, tanks and machine guns, and the novel use of tanks at Cambrai was certainly part of this process. Initially, tanks were successful in the first phase of the breakout but they were not sufficiently mobile to continue the offensive. What was required was either smaller lighter tanks or armoured cars. The Canadian Corps was one of the few units with detachments of armoured cars still available on the Western Front and with this in mind, Brutinel in January 1918 wrote a paper on this matter.<sup>159</sup>

The paper was entitled 'Reorganisation of motor branch – Canadian Machine Gun Corps' in which Brutinel discussed some of the pros and cons of the unit. There were four different sized units within the motor branch, all with separate HQs and equipment. Brutinel was very critical of the Clyne side cars motorbikes which required extensive maintenance and were unreliable. He believed that at this stage of the war, the Autocars were obsolete and described them as 'merely transport rendered cumbersome by the armour.'<sup>160</sup> He proposed that all the units should be disbanded and reorganised with one headquarters, five machine gun batteries of eight guns each and a brigade train. He noted that as the units had been supplied to the Canadian Army fully equipped and funded by private individuals, he wanted to ensure that the original names of the units be continued. He was playing to the political audience here particularly as he was also one of the funders and consequently wanted this role to be remembered.<sup>161</sup> This reorganisation, he believed, would result in 'a well-balanced unit with a greatly enhanced tactical value' and he urged that it be adopted as soon as possible.<sup>162</sup>

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<sup>158</sup> Ibid., Dec. 1917 (L.A.C. Canadian Great War Project).

<sup>159</sup> War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (L.A.C. Canadian Great War Project Appendix I).

<sup>160</sup> Ibid.

<sup>161</sup> Ibid. The original units were the 1<sup>st</sup> Motor Machine Gun Brigade, the Borden Motor Machine Gun Battery, the Eaton Motor Machine Gun Battery and the Yukon Motor Machine Gun Brigade.

<sup>162</sup> Ibid.

In February 1918 Brutinel became aware that the 5<sup>th</sup> Canadian Division - then in England - was to be broken up and he applied to General Currie to have its machine gun units sent to France as motor machine gunners. His rationale was that a second motor machine gun brigade could act as a corps reserve and its mobility would improve the overall tactical performance of the Corps. He had received a note from Brigadier General P.E. Thacker, Adjutant General of the Canadian Army, in February 1918, requesting further information about the motor machine gun brigade as he said that ‘they appear to be expensive, and of doubtful value; and before any large additional equipment and transport is approved an opinion is asked for.’<sup>163</sup> He costed the proposal and figured that the motor brigade would require 237 less troops, thus saving \$500 per day. He then had to travel to England in March, where he met General Turner and Brigadier General McDonald of the Overseas Military Forces of Canada, to persuade them to authorise the additional mobile troops. Each motor brigade was equipped with forty machine guns and 406 troops. This gave the Canadian Corps two well armed motor brigades at a time when future fighting was expected to be severe. Currie agreed with the proposal and recommended it without alteration to Canadian headquarters.<sup>164</sup> Brutinel was forced to write on 5 April to the Canadian military headquarters in London urging them to create the second motor machine gun brigade based on the experience of the 1<sup>st</sup> C.M.M.G.B. in the recent fighting in France where they had proved their tactical value.<sup>165</sup> However, it was not until 1 May 1918 that the unit was authorised; thus it was not available for the battles of March 1918 where it would have played a crucial role. Brutinel got the backing of Field Marshal Sir Douglas Haig for a second mobile unit who wrote in April 1918 that the ‘work of the 1st C.M.M.G. Brigade in recent operations has proved the value that can be obtained from such units, and recommends the formation of a 2nd Brigade be undertaken forthwith.’<sup>166</sup>

Between the Battle of Vimy Ridge and the end of 1917, the Canadian Corps was involved in several battles. August 1917 saw them participate in the Battle of Hill 70 outside Lens, while during October and November 1917, they fought in the final stages of the Battle of Passchendaele. Brutinel and his machine gunners were again to the fore and

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<sup>163</sup> Apr. 1918 (L.A.C. Canadian Great War Project, Appendix A).

<sup>164</sup> Ibid., Feb. 1918 (L.A.C. Canadian Great War Project, Appendix 9-10).

<sup>165</sup> Ibid., Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 8).

<sup>166</sup> Pulsifer, ‘Canada’s first armoured unit’ p. 51.



used eighty-four guns to put down a barrage at the Battle of Hill 70. During the sixth phase of Battle of Passchendaele sixty machine guns were used to provide a rolling barrage in tandem with the artillery and also to provide a protective barrage in front of the red line.<sup>167</sup> Phase eight of the attack in November used 114 machine guns for a similar barrage. After each attack a detailed action report was prepared and improvements noted. For example, the battles for Passchendaele showed that there was a shortage of signallers attached to the machine guns and an increased establishment was called for.<sup>168</sup> One report also suggested that camouflage nets be carried by the advancing troops to hide the guns from enemy aircraft.<sup>169</sup>

The fighting had been particularly severe in the latter stages of the Battle of Passchendaele for the troops of the C.M.G.B., with forty officers and 900 members of other ranks being casualties. However, tactically the machine gunners were starting to coordinate closely with the infantry, and it was recognised that infantry commanders were beginning to understand that this close relationship was necessary. An after-action report noted that ‘the grouping of the machine gun companies under a D.G.M.O. has been fully justified by the recent operations. It would not have been possible to maintain in action such a large number of guns without it.’<sup>170</sup> It was found that the D.G.M.O. could replace guns from his mobile reserve and this led to fewer stoppages of barrage fire due to casualties. The Germans had gone to great lengths to seek and destroy the Canadian machine guns using spotter aircraft and artillery. It was suggested that camouflage netting would alleviate this in the future. It was realised that the most efficient way to employ machine guns was to establish them in bigger units than heretofore, and this was implemented in early 1918.<sup>171</sup>

General Currie was very impressed by the contribution of the machine gunners and wrote to Brutinel to express his appreciation.

I regret that the casualties have been so high but these have resulted from the special efforts made by the enemy to destroy the machine gun crews from whom they suffered so much. All prisoners have testified to the great losses caused by our machine gun fire, while our own infantry are loud in their praises of the

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<sup>167</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 6).

<sup>168</sup> Ibid., Nov. 1917 (L.A.C. Canadian Great War Project, Appendix 11).

<sup>169</sup> Ibid.

<sup>170</sup> Ibid., Dec. 1917 (L.A.C. Canadian Great War Project, Appendix 6).

<sup>171</sup> Ibid.

support rendered by our machine gunners. That the men of the Machine Gun Corps kept their guns in action under the conditions experienced testifies in the highest possible manner to their splendid discipline and fine fighting spirit.<sup>172</sup>

By the end of 1917, Brutinel with the aid of his machine gunners had played a significant role in victory at Vimy Ridge where Brutinel and the Canadian machine gunners fired the largest machine gun barrage of the war to date. These new offensive machine gun tactics had been noticed by officers within the wider British Army who were anxious to learn them and they flocked to visit him in his headquarters. Transnational innovation was starting to take place with visits by British and French officers. Brutinel was aided by the culture within the Canadian Corps under the leadership of Byng and then Currie which encouraged innovation to take place. Currie noted the influence that Brutinel was having in the French and British armies and he sought to have Brutinel promoted on the basis of this work. He made the following comment to the Canadian G.H.Q. in March 1918 concerning Brutinel 'He has been constantly in demand by the French Military authorities to lecture to them, and the British Army has adopted the Canadian machine gun organisation.'<sup>173</sup> The following chapter will address how Brutinel further developed and adopted machine gun doctrine to face the renewed German onslaught in Spring 1918 before leading his machine gunners to victory in November 1918 with new all arms tactics.

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<sup>172</sup>. Lieutenant General Arthur Currie, G.O.C Canadian Corps to Lieutenant Colonel Raymond Brutinel, 10 November 1917 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2).

<sup>173</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Brutinel was promoted to the rank of Brigadier General

## CHAPTER SIX: RAYMOND BRUTINEL – BEGINNINGS OF MOBILE WARFARE IN THE 100 DAYS OFFENSIVE

The Machine Gun Service must be regarded as a distinctive arm with tactics entirely of its own - Raymond Brutinel <sup>1</sup>

### 1918- THE FINAL BATTLES

The strategic position in early 1918 was turning against the Allies. Russia had been knocked out of the war and with that, the Germans had an extra million troops to move to the Western Front. The Americans were sending troops to Europe in ever increasing numbers but they would not arrive until the summer. It was a race against time for the Allies. The Allied High Command was aware of this and expected an attack in early spring 1918. Haig, therefore, ordered his troops to go on the defensive and preparations began for a German attack. The British Army undertook to extend their lines by twenty-eight miles which also imposed strains on the troops.<sup>2</sup>

The battles of 1917 had led to troop shortages and resulted in a reduction in the number of battalions per division from thirteen to ten. There was a scramble for additional troops to be found to fill the depleted ranks and there was talk of reducing the numbers of machine gunners to flesh out the infantry battalions. At a conference of senior commanders at Le Touquet – Paris Plage in early 1918, Brigadier General Bonham Carter of the British G.H.Q. outlined the proposal to reduce the number of machine gunners. This was challenged by Lieutenant General Sir Alymer Hunter Weston who requested that the Canadian Corps Machine Gun Officer be heard before any decision was taken. The General stated, ‘We are not going to decide anything in this matter until we have heard the point of view of Brutinel.’<sup>3</sup> Brutinel arrived the next day and was met by General Bonham Carter who explained at length that after a great deal of thought and

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<sup>1</sup> War diary: Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix i) The memorandum entitled Note for the information and guidance of all officers regarding the organisation of machine gun battalions and their employment is dated 30 April 1918 and signed by General Webber, B.G.G.S. Canadian Corps. However, it is the work of Brutinel and is quoted as such in successive works.

<sup>2</sup> Keegan, *The First World War* p. 421.

<sup>3</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 22.

consideration, the British G.H.Q. had decided on a policy consistent with their falling manpower and that this policy was the subject of discussion at the conference which was in progress. Carter informed Brutinel that he wanted him to support the proposal and allay the fears of the commanders. Brutinel replied ‘that I had no knowledge of the proposals and therefore could not very well understand what was meant, but if General Bonham Carter suggested that I was to go to the conference merely to support the unknown proposals of the British G.H.Q., then I had better go back to my car and return to Corps Headquarters.’<sup>4</sup> Brutinel reiterated that the Canadians were autonomous and that he would only attend the meeting with an open mind, which he did. Once the proposal was explained to Brutinel, he replied that the conversion of machine gunners to infantrymen was wrong. He told the conference that ‘the policy of reducing the number of machine guns would not remedy the shortage of men in the Infantry Brigades but would undoubtedly lower their fire power. I suggested that, on the contrary, the number of machine guns should be increased proportionally to improve, or at least maintain, the fire power of the Infantry Brigades.’<sup>5</sup> According to Brutinel one Infantry Brigadier stood up to say, “I have generally been against any increase of machine guns at the expense of the Infantry Battalions, but things being what they are, I am willing to let go men if my fire power is maintained by a reasonable increase of machine guns.”<sup>6</sup>

There was no agreement and the conference ended, as expected, inconclusively.<sup>7</sup> It was proof of Brutinel’s influence that this proposal was not acted upon and the machine gunners remained as they were. This episode also demonstrates Brutinel’s readiness and ability to stand up for what he believed and is further proof that he acted as a true ‘zealot’ in pursuit of his ideas. Brutinel was clearly the authority on machine guns and that some senior commanders shared his views before the meeting. Hunter Weston’s war diary for this period contains multiple references to attendance at Army and Corps conferences but unfortunately, he does not discuss details of what was mentioned or who attended.<sup>8</sup> However, a memo in Brutinel’s war diaries dated 25 April 1918 notes that

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<sup>4</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 22.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

<sup>8</sup> War diary, Jan – April 1918 (British Library, Hunter-Weston papers, Add MS 48367).

In fact, Colonel Brutinel was called in consultation at G.H.Q. regarding the increase of machine guns in the British Army and it is understood that as a result of this conference, and as a first step towards the large increase contemplated 8 machine gun units are to be organised forthwith for distribution to Armies.<sup>9</sup>

Brutinel notes that eight additional machine gun units were established for distribution to various British Armies.<sup>10</sup> His war diary also contains some of the proposals that he put to a similar Corps Commanders conference on defence schemes in February 1918. In his proposal he suggested substituting Lewis guns for Vickers machine guns and moving the heavier Vickers away from the front lines. The Lewis guns would prove sufficient to provide local defence whereas the heavier machine guns further back would be able to engage a range of targets.<sup>11</sup>



Figure 52: Gunners of the 16th Canadian Machine Gun Company holding the line in shell holes during the Battle of Passchendaele.  
Source: George Metcalf Archival Collection.

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<sup>9</sup> Memo with reference to machine guns, War diary, Machine Gun Officer Canadian Corps, 25 Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 28)p. 5.

<sup>10</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 28).

<sup>11</sup> War diary, Machine Gun Officer Canadian Corps, Feb. 1918 (L.A.C. Canadian Great War Project, Appendix 8).

General Sir Henry Horne, G.O.C. First Army, believed in solving the manpower shortage with the development of mechanical means and wrote in May 1918, 'failing man-power must be met by development of machine-power', such as artillery, machine guns, Lewis guns, tanks and any other proved appliances for supporting infantry by inflicting loss on the enemy.<sup>12</sup> He went on to write that 'the weaker the infantry the greater the necessity for strong support by machine-power' and maintained that it was 'essential to arrange reinforcements so as to maintain the full numbers of batteries, machine gun battalions, etc. at efficient strength, however numerically weak the infantry of the division may become.'<sup>13</sup>

The most important change to machine gun organisation to date occurred in early 1918 when the machine gun companies of a division were organised into a separate machine gun battalion. General Currie signed off on a proposal from Brutinel in January 1918 based, as he said, on the experiences of the Canadian Corps in the recent fighting at Passchendaele.<sup>14</sup> The machine gun battalion would now be the accounting unit for the troops rather than the machine gun companies which would free up the administration and allow the companies to devote their time to fighting and training. The battalion would consist of four companies commanded by a major and each company in turn would consist of four platoons with eight guns each. Each division would have a total of sixty-four guns and would get an additional 288 men. The total strength of the new battalions would be 1,039 in all ranks.<sup>15</sup> There was also an increase in the number of signallers, something that Brutinel had been pushing for, for some time. Currie finished his paper by stating 'It is my considered opinion that the employment of the infantry and resulting wastage through casualties and sickness will be directly influenced this year more than ever before, by the efficiency or otherwise of the machine gun service.'<sup>16</sup> Brutinel spent the first couple of months of 1918 putting this new structure into place and making sure it was ready before the Germans attacked. At the same time machine gun battalions were being established in the rest of the British Army.<sup>17</sup>

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<sup>12</sup> Simon Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* (Farnham, Ashgate, 2010), p. 290.

<sup>13</sup> *Ibid.*

<sup>14</sup> War diary, Machine Gun Officer Canadian Corps, Dec. 1917 (L.A.C. Canadian Great War Project). Brutinel spend Christmas Day 1917 working on the proposal.

<sup>15</sup> War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (L.A.C. Canadian Great War Project, Appendix 2 & 3).

<sup>16</sup> *Ibid.*

<sup>17</sup> Hutchinson, *Machine Guns*, p. 263.

In April 1918, General Currie went further when he added a third company of four batteries to each machine gun battalion. He required 2,400 troops and looked for fifty of the 'best and brainiest men' from each infantry battalion. This added thirty-two machine guns to a Canadian Division. The new establishment of ninety-six machine guns meant that the ratio of machine guns to rifles within a Canadian division would once more match that of the British divisions. On paper, the British divisions had sixty-four guns but they had been reduced to ten battalions.<sup>18</sup> Brutinel backed up this demand and pointed out that this increase in guns would allow some of these machine guns to be placed in a divisional reserve. This reserve could be best utilised to 'form defensive flanks in case of serious penetration by the enemy, in an endeavour to localise his advance and gain time to allow the Corps Reserve to come into play.'<sup>19</sup>

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<sup>18</sup> Ibid., Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 14, Mar. 1918, Appendix 5). In a British division of nine battalions (9,000 rifles) and 64 Vickers guns the proportion was one machine gun to 141 rifles. A Canadian division of twelve enlarged battalions would now have 96 Vickers to 13,200 rifles a ratio of one to 138. As part of the justification for the Canadian increase, Brutinel had shown that the ratio in other armies was, French nine battalions (9,000 rifles) 108 machine guns, a ratio of one to 63, German nine battalions (9,000 rifles) 144 machine guns a ratio of one to 62.5 and an American Division had 225 machine guns but Brutinel did not know at that stage the size of an American division.

<sup>19</sup> Ibid., Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 28).

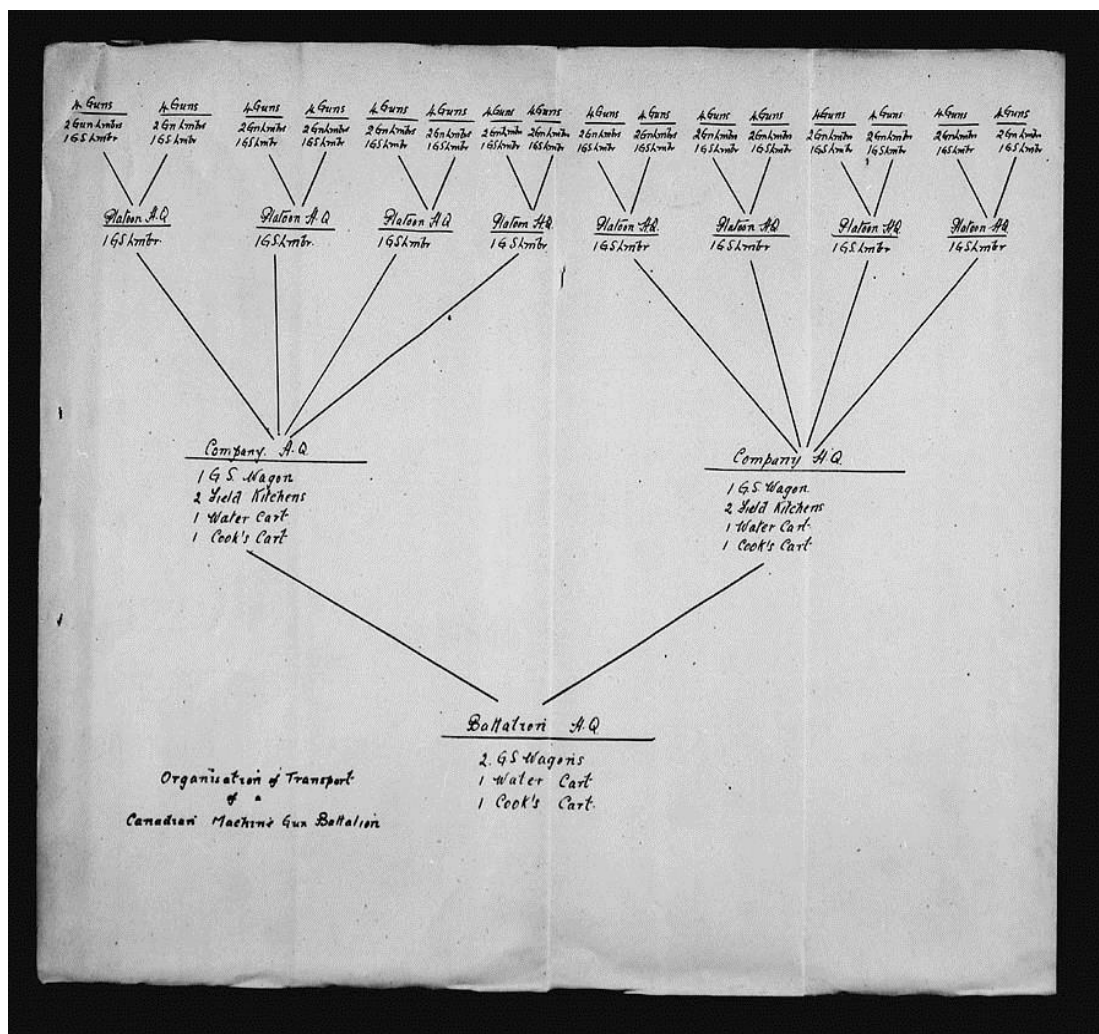


Figure 53: Brutinel's organisational chart for machine gun battalion.  
 Source: War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (L.A.C. Canadian Great War Project).

### MARCH 1918- KAISERSCHLACHT

In early 1918 the Allies were struggling to develop a defensive posture and to this end Brutinel was extremely active. The Canadian Corps was based on Vimy Ridge and spent most of their time rewiring and installing new machine gun posts.<sup>20</sup> The machine gunners and engineers worked closely on these projects. Over seventy-two new artillery positions were built and stacked with ammunition. To protect these positions over 250 miles of trench was repaired or built, with 300 miles of barbed wire entanglements and 200

<sup>20</sup> Grafton, *The Canadian "Emma Gees"*, p. 104.



tunnelled machine guns emplacements.<sup>21</sup> General Currie was very concerned with defence in depth with different layered zones running parallel to each other and the machine gun was key to this plan. He wrote

each defensive system was designed to protect definite topographical features, the loss of any one of which would considerably handicap the defence by uncovering our artillery. As planned the main framework of the defence in depth was based upon machine gun positions, protected by belts of wire entanglements so placed in relation to the field of fire of the machine guns that they enfiladed over the whole length. The whole area was compartmented in such a way that the loss of ground at any one point could be localised and would not cause a forced retirement from adjoining areas.<sup>22</sup>

The Germans launched their long awaited offensive on 21 March 1918. In what became known as the 'Kaiserschlacht' or 'Kaiser's Battle' they attacked the British Fifth Army around St Quentin. The attack was led by specially trained stormtroopers who were trained to avoid strongpoints and continue advancing. By the end of the first day the British had suffered nearly 7,000 dead and 21,000 captured, and the Germans had broken through at several points.<sup>23</sup> The Canadian Corps was not involved in the fighting and remained in situ around Vimy Ridge. The situation was critical and on 22 March 1918 the C.M.M.G.B. was ordered south under the command of Lieutenant Colonel W. K. Walker to report to General Gough of the Fifth Army at Amiens Town Hall. When they arrived in Amiens, Walker was informed that they were the only reserves available and would be used to plug gaps in the front line.<sup>24</sup> They were able to deploy quickly to trouble spots and act as rallying points for the infantry. The brigade contained forty mobile machine guns which acted as mobile machine gun posts and were deployed as such. Over the next couple of weeks, this was the task they performed. Walker reported back regularly to Brutinel, who remained his commanding officer. On 25 March, Walker reported that he had suffered heavy casualties in men, but the Autocars were still operational, and he had received replacements for lost guns. He was very happy to report that the armoured cars

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<sup>21</sup> Ibid.

<sup>22</sup> Grafton, *The Canadian "Emma Gees"*, p. 104.

<sup>23</sup> John, Keegan, *The First World War* (London, 1998). p. 430.

<sup>24</sup> William K., Walker, *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918* (Ottawa, 1957) p. 3. Hereafter referred to as Walker, *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918*. According to Walker 'General Gough expressed himself as being most pleased with the timely arrival of the Canadian Brigade and said he was sure the Canadians would do well with him in the same way they had done well on every front they had fought.'

were used to good effect and that time and time again they stopped German attacks.<sup>25</sup> By 26 March he reported that the casualties to date were eight officers and ninety-two other ranks. Walker described how ‘the sight of our armoured cars also gives confidence to our troops, and at times they gather round them and try to follow them.’<sup>26</sup> He went on to describe an action whereby ‘the enemy – like sheep without a shepherd – walk blindly into our guns, only to be literally mowed down.’<sup>27</sup> Walker also reported an action on 5 April, in which two armoured cars on the road between Amiens and Lamotte came upon a large group of Germans. They fired ten belts of ammunition and did great damage and then retreated back down the road. On 7 April 1918 four French armoured cars reinforced Walker’s force.<sup>28</sup> This was fairly typical of the action undertaken by the C.M.M.G.B. and demonstrated the value of its mobility.<sup>29</sup> Mobile machine guns were ideal in this situation as previously highlighted by John Henry Parker. However, whereas Parker was discussing the use of machine guns with cavalry, the Canadians had taken this a stage further and adopted vehicle transport. The French were also starting to use armoured cars and it made sense to use them to reinforce Walker’s command.

Many messages of thanks were forwarded to Brutinel on the work of the C.M.M.G.B. One was from General Watts, commanding XIX Corps, in which he stated ‘please accept and convey to all ranks who have been engaging in the recent battle my thanks for their excellent work. They have given invaluable service to the XIX Corps.’<sup>30</sup> Brutinel received a verbal message from Major General George Carey thanking him for the excellent work of the C.M.M.G.B.<sup>31</sup> General Currie commended the work of the C.M.M.G.B. during this period when he wrote

The 1st Canadian Motor Machine Gun Brigade (Lt-Col. W.K. Walker), under orders of the Fifth and later of the Fourth Army, was ordered, to fight a rearguard action to delay the advance of the enemy and to fill dangerous gaps on the Army fronts. For 19 days that Unit was continuously in action North and South of the Somme fighting against overwhelming odds. Using to the utmost its great

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<sup>25</sup> War diary, Machine Gun Officer Canadian Corps, Mar. 1918 (L.A.C. Canadian Great War Project, Appendix xi).

<sup>26</sup> Ibid. (L.A.C. Canadian Great War Project, Appendix xxii).

<sup>27</sup> Ibid.

<sup>28</sup> Ibid., Apr. 1918 (L.A.C. Canadian Great War Project, Appendix xi).

<sup>29</sup> Walker, *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918*. p. 7. Walker was under orders to delay the German advance and to be continually on the move.

<sup>30</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project, Appendix xxix).

<sup>31</sup> Ibid.

mobility, it fought over 200 square miles of territory. It is difficult to appraise its correct extent the influence, material and moral, that the 40 machine guns of that Unit had in the events which were then taking place. The losses suffered amounted to about 75 % of the trench strength of the Unit and to keep it in being throughout that fighting it was reinforced daily with personnel of the Infantry branch of the Canadian Machine Gun Corps.<sup>32</sup>



Figure 54: Autocars of the C.M.M.G.B. destroyed by German fire near Licourt.  
Source: Pulsifer, 'Death at Liscourt an historical and visual record of five fatalities in the 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 25 March 1918'.

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<sup>32</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6), (transcript of interview with Brutinel) tape C7. Walker, *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918*. Walker gives a complete account of his time fighting with the British Fifth Army while in command of the C.M.M.G.B.

The Germans also noted the presence of the armoured cars and Brutinel commented on how often they mentioned them on radio communications.<sup>33</sup> The C.M.M.G.B. was successful because they were mobile, yet they had not trained for mobile war in years. Since their arrival in France, they had fought dismounted and had devoted very little time to mobile war. However, at this stage of the war they were well trained troops, with good officers and were able to adapt quickly. They were also equipped with adequate kit which allowed them to fulfil this new role. Brutinel had complained that the Autocars were obsolete, but they proved up to their task in March. Their major drawback was they had no cross-country capability and were forced to use roads which tended to become congested. During this period of fighting the guns were mostly fired from the trucks and rarely dismounted. The unit also benefited from a good sense of esprit de corps which was something that Brutinel had sought to instil.<sup>34</sup> While the C.M.M.G.B. were mobile troops in the sense that they travelled in vehicles, they were not a fully mechanised force and did not carry out any type of cavalry type functions. However, it was the first unit of its type in the British Army and it proved its worth in the March battles. This could be the time to learn the lessons of mobile war and use them in an offensive capacity. The unit reported back to Brutinel on 10 April 1918.<sup>35</sup> Haig was supportive of the work done by the C.M.M.G.B. and endorsed the establishment of a second mobile unit in April 1918.<sup>36</sup>

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<sup>33</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project).

<sup>34</sup> Walker, *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918* p. 1. Walker alludes to the good discipline and the well trained troops of the C.M.M.G.B. during this period.

<sup>35</sup> For a detailed account of the actions during this period read Pulsifer, 'Death at Liscourt: an historical and visual record of five fatalities in the 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 25 March 1918' in *Canadian Military History*, xi, no. 3 (Summer 2002), pp 49-64.

<sup>36</sup> Pulsifer, 'Canada's first armoured unit' p. 51.

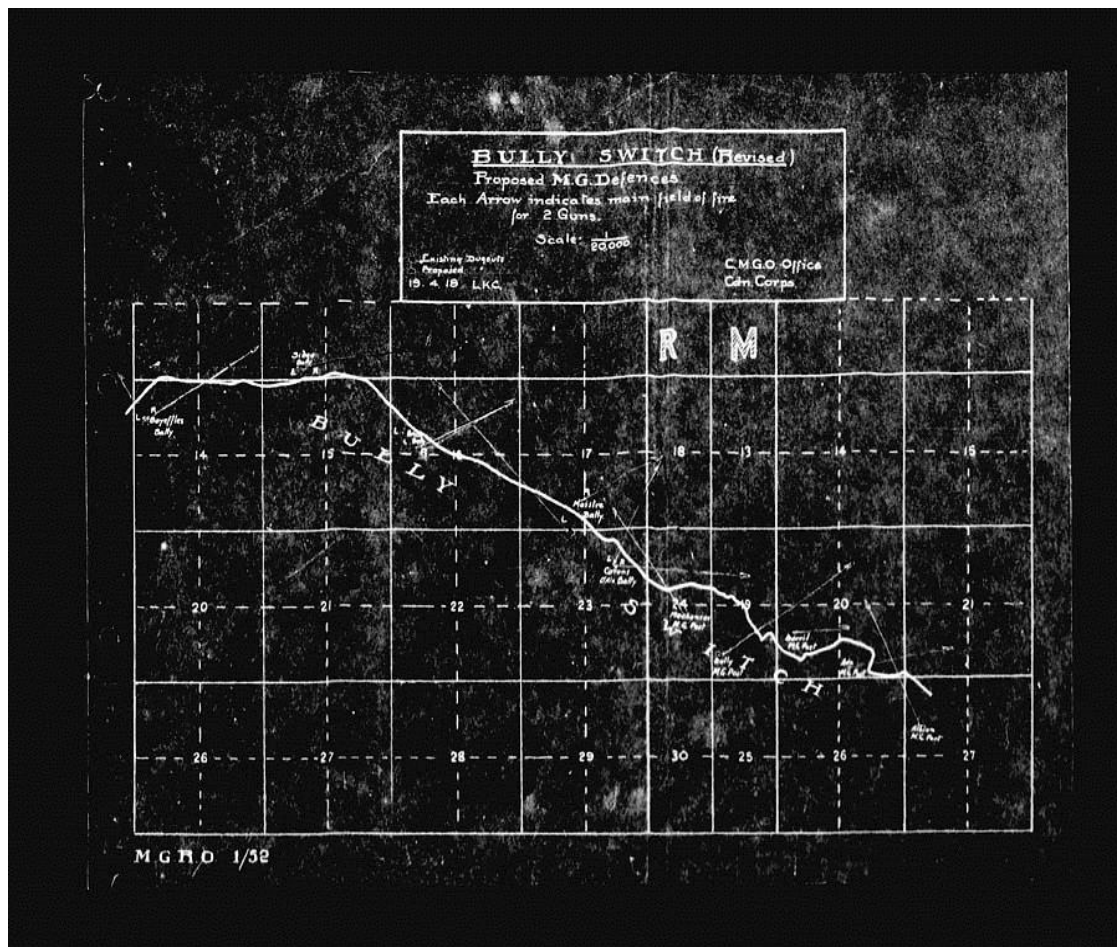


Figure 55: Machine gun defensive plan showing the overlapping fields of fire of sited machine guns on Vimy Ridge, Mar. 1918.  
 Source: War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (Canadian Great War Project).

Immediately, there was an attempt to learn the lessons from the recent operations and to that end Brutinel submitted a report to G.H.Q. entitled 'Notes on defensive employment of machine gun lessons learned in recent fighting'.<sup>37</sup> In the report he highlighted the value of distributing machine guns in depth to 4 to 5,000 yards. He noted that machine guns in the front line had been overrun when they exhausted their ammunition and he warned that gunners needed to keep their cool and conserve their ammunition for viable targets. Unless ordered to retreat, machine gunners were to remain in position even if surrounded. Machine guns were to be utilised as purely defensive weapons and barrage fire was to be limited until the number of machine guns was

<sup>37</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project, Appendix v).

increased.<sup>38</sup> Brutinel was quick to develop tactical changes to counter the new German stormtroopers tactics.<sup>39</sup> He quickly became aware that the Germans were employing snipers to outflank and attack the machine gun crews. To counter this, he proposed a thin line of Lewis guns, in front with small group infantry support, Vickers guns in groups, in echelon extending from 500 to 1,000 yards in the rear of the Lewis guns and then a strong line of infantry a few hundred yards in rear of the machine guns, well rested and fresh for vigorous counter attack through the Vickers line. The turnaround in learning these lessons was vital as more German attacks were expected and at this stage of the war, the allies were quick to accept changes.<sup>40</sup>

Once the Germans attacked, Brutinel was involved in sourcing additional machine gunners. The machine gunners of the 5<sup>th</sup> Canadian Division were due to arrive in France on 24 March 1918 and Brutinel organised motor transport to rush them to the Front from Le Havre. In order to equip them, he ordered guns to be stripped from the Machine Gun Wing of the Canadian Corps School. He also organised detachments of the Canadian Light Horse and Canadian Corps Cyclist Brigade armed with Hotchkiss and Lewis guns to be deployed as a Corps reserve.<sup>41</sup> These reinforcements were sufficient for the Canadian Corps but British G.H.Q. called Brutinel for machine gun reinforcements. He had already dispatched the C.M.M.G.B. south to the Somme, so he suggested to General Dill that ‘the Horse Guards might be quickly trained as Machine Gunners and be made available for service at the front’. Given that nominally the Royal Horse Guards were the personal troops of the King, General Dill initially was hesitant about forwarding the request but once appraised of the situation, the King immediately released the Royal Horse Guards for training to Brutinel. He personally met the Royal Horse Guard Battalions at Boulogne upon their arrival and arranged with the Machine Gun Schools to give them abridged machine gun courses to fit them for their new duties. He detailed one of his officers, Major Lucas to train them and he also considered plans of how to re-equip the machine gunners of the Fifth Army when there was a lull in the fighting.<sup>42</sup>

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<sup>38</sup> Ibid.

<sup>39</sup> Ibid.

<sup>40</sup> Ibid.

<sup>41</sup> Ibid., Mar. 1918 (L.A.C. Canadian Great War Project).

<sup>42</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape C8. On 17 May 1918 he gave a special lecture to these newly formed motor machine gun units of the Guards Division at GHQ; War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project).

Around March 1918, Brutinel began to crystallize his ideas about machine guns and how they should be handled in battle. With the benefit of lessons based on over two years in combat, he attempted to put structure on his ideas, to clearly define the distinct function of machine guns. In a memorandum that he prepared and circulated to the command of the Canadian Corps, he addressed some of the concerns about command and control of machine guns. He stated

The Machine Gun Service must be regarded as a distinctive arm with tactics entirely of its own. In all respects it is the intermediate between the infantry and the artillery, its tactics being radically different from the former and approximating to but not being identified with those of the latter. It must be thoroughly realized that the principles governing the employment of machine gun units is that it is their duty to support the infantry in all phases of the fight and to cooperate constantly with them. But they are not part of the infantry and must not be considered as such.<sup>43</sup>

He advised that

There is established the fact that Machine Gun Battalions are Divisional troops and should be employed to support infantry in accordance with the plans of the G.O.C. Division. It is essential that, under all conditions, the machine gun resources of a division should be kept as fluid as possible and their distribution on a divisional front should be based solely on tactical considerations.<sup>44</sup>

He also urged that

A machine gun commander should be given definite orders by the infantry commander, to whom he is tactically attached, as to what is required of him but he should be allowed as much freedom of action as possible in carrying out these orders and should be kept informed of all changes and developments of the situation which may affect his actions.<sup>45</sup>

This text is quoted in full to show how much machine gun doctrine had evolved. It had taken until April 1918 for Brutinel to commit his ideas to paper. This statement was written in tandem with the publication of SS192 which was the final statement of machine gun doctrine issued by the British General Staff. Under the heading of 'Liaison'

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<sup>43</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix i). The memorandum entitled Note for the information and guidance of all officers regarding the organisation of machine gun battalions and their employment is dated 30 Apr. 1918 and signed by General Webber, B.G.G.S. Canadian Corps. However, it is the work of Brutinel and is quoted as such in successive works.

<sup>44</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix i).

<sup>45</sup> Ibid.

Brutinel wrote in a withdrawal ‘the definite stopping power of the machine guns should be utilised by Infantry Commanders to the utmost. Infantry instinctively reform under cover of fire from machine gun batteries which are natural rallying points for them.’<sup>46</sup> He also wrote that it was ‘the duty of the Commander of the infantry force to arrange, automatically, for the protection, particularly of the flanks, of any Machine Gun Units which are cooperating with him, and, in consultation with the Machine Gun Commander, make any definite arrangements for any advance, counter-attack or other tactical manoeuvre.’<sup>47</sup> He summarised the principles which would apply in a ‘moving battle’ as follows:

- a) Machine guns are employed apart from the infantry.
- b) Under certain circumstances, and to a certain extent, machine guns replace artillery.
- c) Machine guns must be distributed in depth, must be able to intervene in the fight by opening fire rapidly to a flank, even when advancing, and must be the main protection against the enemy’s counter attacks.
- d) Machine guns follow the waves of attacking infantry, advancing in alternate sections by large bounds, making every use of the ground, and taking up positions from which overhead or flanking fire can be brought to bear on the enemy.
- e) The aim of the machine gun commanders at all times must be the production of the greatest possible fire at those points where the hostile infantry is fighting most vigorously so to assist the progress of our infantry in the attack by bold and opportune action.
- f) In the moving battle the machine guns should be so disposed and so handled that the largest possible number will automatically intervene by fire at any point where our infantry is held up, being attracted, as it were, by the localities where our infantry meets the greatest resistance.
- g) The engagement of the machine gun in reserve, Brigade or Divisional, should be governed by the tactical situation and the urgency of breaking definitely the resistance of the enemy at certain points.<sup>48</sup>

This seems to put forward the idea that everything should revolve around machine gunners and rather than the machine gunners supporting the infantry. Some of these recommendations were incorporated into new doctrine for the British Army. This memo was the culmination of Brutinel’s thinking and summarised exactly what he thought

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<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

<sup>48</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix i).



machine guns should be used for. It had the effect of placing the divisional machine guns under the tactical control of the D.M.G.O. who would now act rather like a divisional artillery officer. The official Canadian history noted that this change was not implemented in the rest of the British army until November 1918, a full six months after the Canadians had adopted it.<sup>49</sup>

Brutinel, like other machine gun advocates, occasionally claimed too much for machine guns, with the result that they failed to deliver on some of their predictions. The problem, of course, was that there was always competition between the services for the scarce resources available and each advocate believed that their proposal was the more valued. Brutinel depended on the support of Generals Byng and Currie and he seemed to have good relationships with them which helped his cause.<sup>50</sup>



Figure 56: Canadian armoured cars going into action at the Battle of Amiens.  
Source: Library and Archives Canada, Online MIKAN no. 3194818.

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<sup>49</sup> Nicholson, *Official history of the Canadian Army*, p. 383.

<sup>50</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). In March 1918, Currie wrote a letter of support for Brutinel praising him to Canadian G.H.Q. to endorse his promotion to the rank of brigadier general.



Figure 57: Canadian Autocar driving in the victory parade through Mons on the afternoon of 11 Nov. 1918.  
 Source: Pulsifer, 'Canada's first armoured unit', p. 52.

#### THE 100 DAYS OFFENSIVE AND THE ROLE OF THE CANADIAN MACHINE GUN CORPS

By late July 1918 the German onslaught was over. The German assaults had been defeated and they had suffered close on a million casualties.<sup>51</sup> It was time for the Allies to go over to the offensive. The strategic situation was that the Allied forces now nominally had a unified command structure, under the command of Marshal Foch.<sup>52</sup> He planned a series of simultaneous assaults along the entire front, which would overpower the already weakened Germans and force a breakthrough.<sup>53</sup> As part of the plan, the Canadian Corps

<sup>51</sup> Keegan, *The First World War*, pp. 438-39.

<sup>52</sup> *Ibid.*, p. 432. Foch was appointed to coordinate the actions of the British and French Armies on 26 March 1918 and this was extended on 3 April 1918 to take full command of the strategic operations of all Allied Armies.

<sup>53</sup> Peter, Simkins, *From the Somme to victory the British Army's experience on the Western Front 1916-1918* (Barnsley, 2014) p. 57. According to Simkins, from September 1916 onwards Foch developed the idea of exploiting success laterally whereby instead of a big breakthrough it would be better to launch attacks successively across different sectors in a rolling series of blows with the aim of keeping the Germans off balance and over a period of time destabilising their defence. Foch named this operational method 'general battle' (*bataille generale*).

was moved into reserve and underwent a series of training and reinforcement. For the machine gunners, this meant the absorption of new recruits. The C.M.M.G.B. had suffered heavily during the spring battles and now required reinforcements. Official authorisation had come through for the establishment of a second motorised brigade. The original brigade was split apart to provide a cohort of experienced personnel for the second brigade. Additional vehicles were provided in the form of Napier three ton trucks. These were not armoured, unlike the Autocars but were the only vehicles available. In order to strengthen the firepower of the motorised brigades, they were equipped with mortar firing lorries. These lorries carried a six-inch medium mortar each which had a range of about four hundred yards.<sup>54</sup>

In April 1918 added mobility was guaranteed to the mobile brigades by the establishment of a Canadian Machine Gun Corps Mechanical Transport Company for the administration and maintenance of the transport.<sup>55</sup> This created efficiencies in the management of scarce resources and again demonstrated Brutinel's organisational ability. In May there was a reorganisation of the Machine Gun Wing of the Canadian Corps School at Aubin Saint Vaast into the Canadian Corps Machine Gun School, and in June 1918, a Machine Gun Wing of the Canadian Corps Reinforcement Camp was founded.<sup>56</sup> These new services completed the changes in the organisation of the Canadian Machine Gun Corps. At the end of the war its authorised strength had risen to 8,771 in all ranks.<sup>57</sup>

A key lesson that Brutinel and the senior command of the Canadian Corps learned from the March battles was the versatility of mobile machine guns. Brutinel was particularly happy with the sanction of the second mobile brigade. The Canadian Corps was the only unit in the British Army which had this type of unit, and indeed, it now had two mobile units, each armed with forty machine guns and over 400 officers and men.<sup>58</sup>

As Brutinel refined and integrated his mobile brigades, he reviewed some tanks to see if they could be incorporated into his force. The Canadian Corps had no tanks, all tanks being part of the Tank Corps. Tanks at this stage of the war were broken into two main types, the Mark V medium tank which had a speed cross country of 4-5 miles per

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<sup>54</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>55</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (L.A.C. Canadian Great War Project).

<sup>56</sup> War diary, Machine Gun Officer Canadian Corps, June 1918 (L.A.C. Canadian Great War Project).

<sup>57</sup> Nicholson, *Official history of the Canadian Army*, p. 384.

<sup>58</sup> Grafton, *The Canadian "Emma Gees"*, p. 212.

hour and was armed with a mixture of machine guns and 6-pounders.<sup>59</sup> These tanks were not very reliable and prone to breakdown and in attack could not be used on a continual basis. After the first day of an attack, medium tanks tended to suffer heavy casualties due to breakdown, enemy activity and hence could not continue the attack. What was required was a lighter faster tank that could keep up with the infantry throughout the offensive. The Whippet Mark A was designed for this purpose. It had a top speed of about eight miles per hour and was crewed by three men and armed with four Hotchkiss machine guns.<sup>60</sup> Over two hundred were built during 1917 and they first saw action in the March battles on the Somme. Brutinel attended a demonstration of tanks by the Australian Corps at Vaux-en-Amienois with another Canadian officer on 29 July 1918.<sup>61</sup> It is unclear whether he was impressed but there were constraints on him as he endeavoured to incorporate them into his mobile brigade. They would have provided his mobile units with a cross-country capability which they lacked.

For the attack on Amiens in August 1918, the Canadians did use tanks to move machine guns across 'no-man's land'. Obsolete Mark IV tanks were stripped of guns and loaded with machine gunners from the 4<sup>th</sup> Canadian Machine Gun Battalion. The tanks were to advance eight miles to the Blue line and then disgorge their crews and machine guns to hold the line until the infantry advanced.<sup>62</sup> On the day of the attack, however, this did not work out as planned. Heat and fumes inside the tanks caused most of the troops to be dropped off with their machine guns before the Blue line and simply accompanied the nearest infantry.<sup>63</sup> A Lieutenant F. M. MacDonald reported that his tank did reach his target and was able to unload the gunners as intended. They put up a defence and held out for several hours against superior forces.<sup>64</sup> This was the first attempt at developing the concept of armoured personnel carriers it but failed due to the unsuitability of the technology. These support tanks were not very effective at transporting troops. While protected from enemy machine guns, the fumes, heat and noise so disorientated the troops that it took at least an hour before they could operate effectively. Like their combat equivalent, they were not mechanically reliable and their real issue was that they were

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<sup>59</sup> J. F. C., Fuller, *Tanks in the Great War 1914-1918* (New York, 1920) p.44.

<sup>60</sup> *Ibid.*, p.45.

<sup>61</sup> War diary, Machine Gun Officer Canadian Corps, July 1918 (L.A.C. Canadian Great War Project).

<sup>62</sup> Grafton, *The Canadian "Emma Gees"*, p. 142.

<sup>63</sup> *Ibid.*, p. 147.

<sup>64</sup> *Ibid.*, p. 148.

merely a by-product of mainstream tank development. Because of this there was no thought given to troop comforts or safety. The use of armoured transport as armoured personnel carriers was a continuation of the developments of tanks. This would manifest in the next war, with the development of halftracks in the US and Soviet armies. Motor transport was more reliable than tracked vehicles, but still had poor cross-country capability so was not attempted.<sup>65</sup>

Brutinel was responsible for the training schedule of the Canadian machine gunners and it is interesting to note the various scenarios that were created.<sup>66</sup> Gone were the trench warfare assault tactics and more focus was placed on mobile warfare. Brutinel had the ideal units for this type of new warfare. Tactics were continually evolving and Brutinel strove to incorporate new forces with his mobile machine guns. Cyclist troops were ideal for this new force. The primary roles of the cyclists were reconnaissance and communications. They were armed as infantry and could provide mobile firepower if required. In terms of troops under the command of Brutinel, he now had two motorised machine gun brigades, the Canadian Corps Cyclist Battalion and a mobile mortar detachment.<sup>67</sup> Starting in May 1918, when the Canadian Corps was in reserve behind the lines at Pernes, Brutinel devised a series of training scenarios that resembled modern 'all arms warfare.'<sup>68</sup> It should be noted that this was how Brutinel envisaged war when he signed up in 1914 – using of vehicle technology to fight war. He had always wanted to use his mobile troops as an advance guard, troops that would push forward in advance of infantry and hold ground with their heavy firepower. Kitchener had rejected this concept on seeing Brutinel's unit in 1914 and declared that a mobile machine gun unit would 'unbalance the fire power of a division.'<sup>69</sup> This view was still prevalent in the High Command as Brutinel's Force had to be established as a separate independent unit and

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<sup>65</sup> Philip, Trewhitt, *Armoured Fighting Vehicles* (Bristol, 1999) pp 190-195.

<sup>66</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix viii).

<sup>67</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>68</sup> Jonathan Boff, 'Combined arms during the hundred days campaign August-November 1918' in *War in History*, vii, no. 4 (2010), p. 474. This implied that different arms would work together to provide mutual support. 'All arms warfare' has been described as containing all of the main arms of an army which in the First World War were infantry, artillery, cavalry, machine guns, tanks, gas, aircraft. Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* p. 126. Boff maintains that historians occasionally use the terms 'combined arms' and 'all arms' interchangeably.

<sup>69</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 7.

part of the Corps establishment. It had now become a new type of unit, one that was very powerful in firepower, and hence needed to be controlled at the correct level of authority.

During this period Brutinel created a unit that was unique. It envisaged a new type of open warfare but would have sufficient self-contained units to deliver all arms warfare. It would be mobile, through the use of lorries and bicycles, have mobile heavy weapons at its disposal, machine guns and mortars and later on in the campaign it would have full mobility with the addition of light cavalry. As a combined unit, it showed a synergy that had not been seen to date in the war. It was the one of the first units in the British Army that demonstrated these capabilities.<sup>70</sup> The machine gun battalions were now well established within the infantry divisions under the command of a D.M.G.O. and therefore, Brutinel could now devote all his time and resources to the mobile brigade. The machine gun battalions would play a full part in the coming battle but not under the guidance of Brutinel.



Figure 58: An Autocar during the Battle of Amiens, Aug. 1918.  
Source: Pulsifer, 'Canada's first armoured unit', p. 54.

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<sup>70</sup> Griffith, *Battle tactics on the Western Front* p. 161, A cavalry battlegroup was formed at High Wood in July 1916 which contained field engineers with bridges, two armoured cars, a machine gun squadron and a field artillery battery. This unit was built around cavalry whereas Brutinel's unit was based around the machine gunners as core troops. Kenyon, 'British cavalry on the Western Front 1916-1918', p. 105. On the 26 March 1917, The 9<sup>th</sup> Light Armoured Car Battery was attached to the 2<sup>nd</sup> Indian Cavalry Division with six Rolls Royce armoured cars. This force named 'Ward's Force' after its commander, attacked Roisel as part of the Battle of Arras. The armoured car attack was successful but the cavalry struggled in the marshy ground. This is one of the first recorded instances of combined armoured car and cavalry cooperation.

The 16 May 1918 saw Brutinel engaged in a training exercise commanding the Canadian Light Horse, Canadian Cyclist Battalion and the C.M.M.G.B.<sup>71</sup> The assignment was designed to demonstrate the close liaison required between disparate units in open warfare. General Webber, who supervised the event, addressed the officers afterwards and commented that the lesson learned was that ‘the enormous resisting power of a highly organised concentrated force of M.M.Gs supported by a small cavalry and cyclist escort.’<sup>72</sup> Webber also made a comment that the machine guns should in future be unloaded some distance from the firing position and then manhandled into position to avoid the lorries being destroyed by enemy artillery. Brutinel countered this by pointing out that in the recent battles on the Somme, the lorries had driven right up unto the firing line and survived. Also, speed was of the essence and with a disorganised enemy, the lorries would survive the front line. Webber then concurred with Brutinel.<sup>73</sup>

The exercises continued for a couple of days with different scenarios being tried each day. Artillery was demonstrated by the use of flags and afterwards two of the competing generals, Webber and Odlum discussed how artillery could be deployed quickly to cover open infantry attacks. They decided that Lewis guns would provide support against infantry attack.<sup>74</sup> Brutinel’s troops practised offensive tactics using the armoured cars with attached cyclists and cavalry to push forward as screening forces. A typical force was a squadron of light cavalry with a battery of machine guns. On alternative days, the forces practised defensive tactics and were normally used to plug gaps in the defensive lines, a task they had performed well during the Somme battle.<sup>75</sup> Other Canadian forces were involved in this training including artillery, infantry and machine gun battalions.<sup>76</sup> It is interesting to note that while this type of open warfare training was taking place, the Allies were still under German assaults. These German attacks would not give out until July with the second battle of the Marne. It demonstrates that the Canadians were evolving their battle tactics continually with Brutinel playing a key part.

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<sup>71</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix viii).

<sup>72</sup> Ibid.

<sup>73</sup> Ibid.

<sup>74</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project, Appendix viii).

<sup>75</sup> Ibid.

<sup>76</sup> Grafton, *The Canadian “Emma Gees”*, p. 119.

According to Tim Travers, from July 1918 the British Army adopted two different offensive methods, the first was the traditional infantry – artillery offensive but using much more artillery, machine guns and mortars than ever before. These new tactics were used in an action at Meteren on 19 July 1918 when 80,000 6 inch shells and 20,000 8 inch shells were fired to cover an attack by the 19<sup>th</sup> Division. There was also a machine gun barrage fired with trench mortars providing close support. The attack was a complete success with the Germans taken by complete surprise.<sup>77</sup> The second type of offensive tactics employed combined tanks, infantry and artillery and was first used by the Australians in an attack on Hamel on 4 July 1918.<sup>78</sup> This attack was a more mechanical type of warfare, using different types of tanks (sixty Mark V, four infantry supply tanks) plus infantry trained to advance with the tanks in a mutual defensive capacity<sup>79</sup>. It was the start a new type of warfare but was still crude. The attack on Hamel by the Australians was successful and Travers identifies the element of surprise and the combined training of the tanks and infantry as being crucial in achieving success.<sup>80</sup> The Australian official history noted that the Australian infantry trained with tanks from 26 June 1918 onwards and Sir John Monash described the manoeuvres:

Set-piece manoeuvre exercises on the scale of a battalion were designed and rehearsed over and over again; red flags marked enemy machine-gun posts; real wire entanglements were laid out to show how easily the tanks could mow them down; real trenches were dug for the tanks to leap and straddle and search with fire; real rifle grenades were fired by the infantry to indicate to the tanks the enemy strong points which were molesting and impeding their advance. The tanks would throw themselves upon these places, and, pirouetting round and round, would blot them out, much as a man's heel would crush a scorpion.<sup>81</sup>

The Australians continued to use these combined tactics and adopted them for the Battle of Amiens. Attacking with the Canadian Corps, the co-operation between the Australian infantry and their attached tanks was one of the successes of the battle.<sup>82</sup>

Jonathan Boff in his book *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*, published in 2012 has proposed three

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<sup>77</sup> Travers, *How the War was Won*, p. 112.

<sup>78</sup> Ibid.

<sup>79</sup> Ibid.

<sup>80</sup> Ibid.

<sup>81</sup> C.E.W. Bean, *Official history of Australia in the War of 1914-1918* (12 vols., Sydney, 1942), vi, 268.

<sup>82</sup> Ibid.



different models of combined arms tactics based on fire power that were practised by the British Army in the later stages of the First World War.<sup>83</sup> The first school of thought argues that the British Army applied a coherent all-arms tactical design during 1918. According to Boff, Dan Todman and Gary Sheffield identified the British Army as a ‘highly effective, battle-winning all-arms force.’<sup>84</sup> Sheffield wrote that the key to victory ‘was the creation of a highly effective weapons system, into which all arms were integrated: infantry, armour, artillery (which above all was the battle winning weapon), airpower, machine guns and wireless communications’.<sup>85</sup> Similarly, Albert Palazzo has written that the synergy associated with different weapon systems, i.e. artillery, tanks and gas, enabled the British Army to open up the battlefield and defeat the Germans in a relentless series of actions.<sup>86</sup> Simon Robbins acknowledges this as ‘a blueprint, which the British would use to produce stunning results on the Western Front in the second half of 1918.’<sup>87</sup> The second view, articulated by J.P. Harris and Niall Barr denies the existence of a single winning formula and maintains that ‘different combinations of arms had to be used to meet rapidly changing circumstances’ and that ‘to think in terms of the constant application of a set formula would be to underestimate the dynamism and complexity of the campaign.’<sup>88</sup> The third group of academics according to Boff take a narrower view of combined arms, only looking at infantry-artillery cooperation and downplaying the role of tanks and aircraft.<sup>89</sup> Bill Rawling maintains that ‘the combination of artillery, machine guns and infantry ... proved capable of breaking into German defences.’<sup>90</sup> Jonathon Bailey on the other hand believes that the period 1917-18 marked ‘the birth of [sic] modern style of warfare: the advent of three-dimensional conflict through artillery indirect fire as the foundation of planning at the tactical, operational and strategic levels of

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<sup>83</sup> Jonathan, Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* (Cambridge, 2012) pp 124-5. (hereafter Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*)

<sup>84</sup> Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*, Boff, identifies Sheffield, Todman, Palazzo and Robbins as having similar ideas.

<sup>85</sup> Gary, Sheffield, ‘How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918’ in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000), p. 131.

<sup>86</sup> *Ibid.*, p. 125.

<sup>87</sup> *Ibid.*

<sup>88</sup> *Ibid.*

<sup>89</sup> *Ibid.* According to Boff, the academics involved in this viewpoint are Paddy Griffith, Bill Rawling, Jonathon Bailey and Tim Travers.

<sup>90</sup> *Ibid.*

war'<sup>91</sup> As part of this school of thought, Paddy Griffith's view is more infantry based.<sup>92</sup> Like Peter Simkins, Griffith believes that the development of infantry weapons and tactics had evolved to the extent that platoons had become mini combined arms units.<sup>93</sup> Tim Travers has a slightly different view of this infantry centred army and maintains that 'GHQ emphasised an infantry-centred army, with all other arms acting as auxiliaries to the infantry.'<sup>94</sup>

All of these schools of thought demonstrate that the British Army had evolved over time and by 1918 had changed fundamentally in how they viewed new weapons. Boff points out that not all attacks launched during the Hundred Days Offensive were combined arms attacks.<sup>95</sup> At no time during this period were all six arms (artillery, cavalry, gas, tanks, machine guns and air power) employed at the same time.<sup>96</sup> Of 202 attacks launched by the Third Army, machine guns were used offensively in forty attacks, or 20 per cent whereas gas was used in only five attacks.<sup>97</sup> The RAF were employed in a significant role on six occasions.<sup>98</sup> Tanks were used in over fifty attacks and their use declined over the period as the Tank Corps suffered unsustainable losses.<sup>99</sup> Artillery infantry cooperation was used in ninety two per cent of the attacks and formed the core of combined attacks for the Third Army.<sup>100</sup> This leads to suggest that the new weapons were not as important as first thought but rather it was the traditional arms combined with modern weapons and tactics that achieved victory. The development of machine gun doctrine was part of the improved integration into the infantry battle line.

Training continued during June and an exercise for the 1<sup>st</sup> Canadian Division was planned for the start of July with these lessons to be learned

- i. The method of advance – by infiltration.
- ii. The manner in which machine gun defence can be penetrated by fire, use of ground, and support of neighbouring platoons.
- iii. The co-operation of tanks.

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<sup>91</sup> Ibid.

<sup>92</sup> Ibid.

<sup>93</sup> Ibid.

<sup>94</sup> Ibid.

<sup>95</sup> Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* p. 136.

<sup>96</sup> Ibid.

<sup>97</sup> Ibid. p. 140.

<sup>98</sup> Ibid. p. 137.

<sup>99</sup> Ibid. pp 141-2.

<sup>100</sup> Ibid.

- iv. The co-operation of forward artillery guns and light and medium trench mortars.
- v. The possible use of smoke either by tanks or rifle grenades.<sup>101</sup>

As part of this training operation, the 7<sup>th</sup> Canadian Infantry Battalion had the following troops attached, one contact aeroplane, one section of eighteen pounder guns, four tanks, one section of four machine guns, two light trench mortars and two medium trench mortars.<sup>102</sup> This was the start of all arms warfare. Brutinel was combining his mobile machine guns with other mobile troops and training them to push forward. Once in contact with the enemy they would drop the machine guns and then move the vehicles lorries to safety. C.S. Grafton described this period of training as follows:

Intensive open warfare training was the daily regime. It was a quick about-turn from the defensive strain under which the Canadians had held Vimy. There were no tapes here. There was more flexibility, more dash to the daily training as whole brigades, usually supported by a complete machine gun company, moved up to the attack, with tanks setting the pace, smoke bombs providing a screen, planes zooming overhead indicating by flares machine gun strong points and the echelon of machine gun transport developing a hell for leather school of getting into action that was in the best horse artillery tradition.<sup>103</sup>

Grafton wrote the semi-official history of the C.M.G.C. in 1938 and his language is typical of the time and place. He does, however, convey the sense that this training period was different from previous preparations and that finally the Canadians were beginning to express themselves in warfare and adapt new technology. General Rawlinson in December 1919 expressed his thoughts on combined arms and the training required for the Hundred Days Offensive

It would be impossible to select for special praise any particular branch of the service, when all carried out their share and cooperated so effectively to the common end, but no factor did more to bring about success than the close and skilful co-operation with the infantry, of the various arms - cavalry, artillery, machine-gunners, engineers, the Air Force, and last but not least the tanks. There is always a tendency on the part of a new service like tanks, aeroplanes, or even machine-guns, when first employed in a general action, to think that they can win the battle "on their own," and it is a matter of time and

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<sup>101</sup> War diary, Machine Gun Officer Canadian Corps, July 1918 (L.A.C. Canadian Great War Project).

<sup>102</sup> Ibid.

<sup>103</sup> Grafton, *The Canadian "Emma Gees"*, p. 119.

careful training to get each arm to exert its maximum effort, not independently but in combination. To ensure this is no easy matter, but I attribute the success of the battles of the hundred days chiefly to three paramount factors: first, the unity of purpose and whole-hearted co-operation of all concerned; secondly, the combined tactics of all the fighting services based on the lessons of four years of war, and thirdly, the invincible will to conquer of every officer, non-commissioned officer, and man.<sup>104</sup>



Figure 59: C.M.M.G.B. waiting alongside the Arras–Cambrai road in Sept. 1918. Note the new type of transport, the mortars mounted on the back of the trucks and the white stripes for aircraft identification.

Source: Pulsifer, ‘Canada’s first armoured unit’, p. 52

In early August the Canadian Corps headquarters was based at Molliens Vidame about twelve miles from Amiens and it was here that the machine gunners continued to conduct combined training with cavalry, cyclists, tanks, lorry mounted mortars and infantry. One such exercise on 4 August 1918 pitted the 2<sup>nd</sup> C.M.M.G.B. and the 1<sup>st</sup> C.M.M.G.B. against each other. The 2<sup>nd</sup> C.M.M.G.B. was to act as the enemy force and to advance with a line of skirmishers, with the intention of drawing out the Canadian

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<sup>104</sup> Archibald, Montgomery, *The story of the Fourth Army in the Battles of the Hundred Days, August 8<sup>th</sup> to November 11<sup>th</sup>, 1918* (London, 1919) p. x.

machine gunners.<sup>105</sup> After the exercise, lessons were noted and disseminated to the troops. Some of the points noted were that the enemy force was quick to spot a great deal of movement around the machine gun positions, hence leading to potential casualties. It was suggested that the cyclists could be better used to screen the machine gun posts in future. Liaison was crucial and a lieutenant was to be appointed in each unit to link with cavalry or other cooperating troops.<sup>106</sup> Another exercise also demonstrated the need for cooperation between the newly combined troops and tasked the cyclists with specific jobs. They were to act as scouts, patrols, escorts to machine guns, snipers and they were to carry ammunition to machine gun positions. The armoured cars were to act as an advance guard until batteries were in position and settled down and then move away so as not to give away the positions.<sup>107</sup>

At the end of the training period, Brutinel had welded his troops into a well-developed, self-contained battle group called the Canadian Independent Force (C.I.F.) which later became known simply as 'Brutinel's Force'. This was a unique unit in the British army at this time, and as such was to play a pivotal role in the coming battle. Clearly, the components of 'all arms warfare' were present in this period of training, although in a crude form. The Canadian Corps had been fighting in France for four years and the majority of its training has been focused on trench warfare. To suddenly switch to open warfare required a huge effort and subsequent events showed that the transition was not complete, but it was a start and a reasonable beginning. During the period of fighting Brutinel continued to build on his ideas in a drive to develop the ideal tactical unit. On the eve of battle, the order of battle of the C.I.F. was as follows

Headquarters

Commander

2 staff officers

3 orderlies

C.W. Signal section

10 motor cyclists

a) Armoured car detachment – Commander - Captain R.C. Clark 1<sup>st</sup>  
C.M.M.G.B.

4 armoured Autocars

10 motor cyclists

1 platoon cyclists

b) 1<sup>st</sup> Group – Commander - Lieutenant Colonel Walker

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<sup>105</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>106</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>107</sup> Ibid.

5 Motor M.G. batteries  
 20 motor cyclists  
 2 platoon cyclists  
 c) 2nd Group – Commander - Major Meurling  
 5 Motor M.G. batteries  
 20 motor cyclists  
 2 platoon cyclists  
 d) 3rd Group – Commander - Major Humpery  
 1 Armoured Autocar  
 2 Platoons cyclists  
 10 motor cyclists  
Supply Column - Commander Lieutenant May  
 1 water lorry  
 1 supply lorry  
 1 ammunition lorry  
 1 fuel and oil lorry  
 5 motor cyclists  
 2 first aid lorries  
 The section of 6” Newton mortars was to move with the leading M.G. battery behind the armoured car detachment.<sup>108</sup>

The full complement of staff of the two mobile brigades was 52 officers and 812 other ranks with eighty Vickers and nine Lewis guns.<sup>109</sup> The expectation for the unit was high as it was an experimental unit; yet it was given a fairly wide remit. There was a realisation that the tide of war might be turning, so new tactics might be able to break the deadlock.<sup>110</sup>

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<sup>108</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project). Appendix iv.

<sup>109</sup> Ibid.

<sup>110</sup> Jonathon, Boff, ‘Command culture and complexity Third Army during the Hundred Days, August – November 1918.’ in Sheffield, Gary and Peter Gray, *Changing war the British Army, the hundred Days campaign and the birth of the Royal Air Force, 1918* (London, 2013) p. 19.

Haig began planning for the attack on Amiens in late April, and it was put into action once it was realised that the German offensives were finished. As part of that plan of attack, a deception plan was hatched to confuse the Germans. Due to the reputation of the Canadian Corps, it was believed that once the Germans realised the Canadians had moved from the Third Army area, they would think that an attack would follow. To that end a deception ploy was enacted. A series of false moves were organised during daylight, which generated a lot of dust and dummy wireless traffic, to a fictitious concentration area some twenty miles north-west of Arras. The Germans picked up on this and did not realise that the Canadians had been moved. Some of the Canadian machine gunners were left behind at Vimy Ridge to fire a barrage, a sure sign that an attack was imminent. Then secretly the Canadians were moved to the forward areas in front of Amiens at the beginning of August. Rob Thompson has written a very informative analysis of the preparations that the Canadian Corps went through in the period prior to the Battle of Amiens from a logistic viewpoint. He maintains that at that stage of the war the B.E.F. and the Canadian Corps, had developed a sophisticated level of logistic and administrative support and this was similar to the learning curve that had occurred in the rest of the service arms.<sup>111</sup>

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<sup>111</sup> Rob Thompson, ‘Delivering the Goods.’ Operation Landoverly Castle: a logistical and administrative analysis of Canadian Corps preparation for the Battle of Amiens 8-11 August 1918.’ in Sheffield, Gary and Peter Gray, *Changing war the British Army, the hundred Days campaign and the birth of the Royal Air Force, 1918* (London, 2013) pp 37-55.

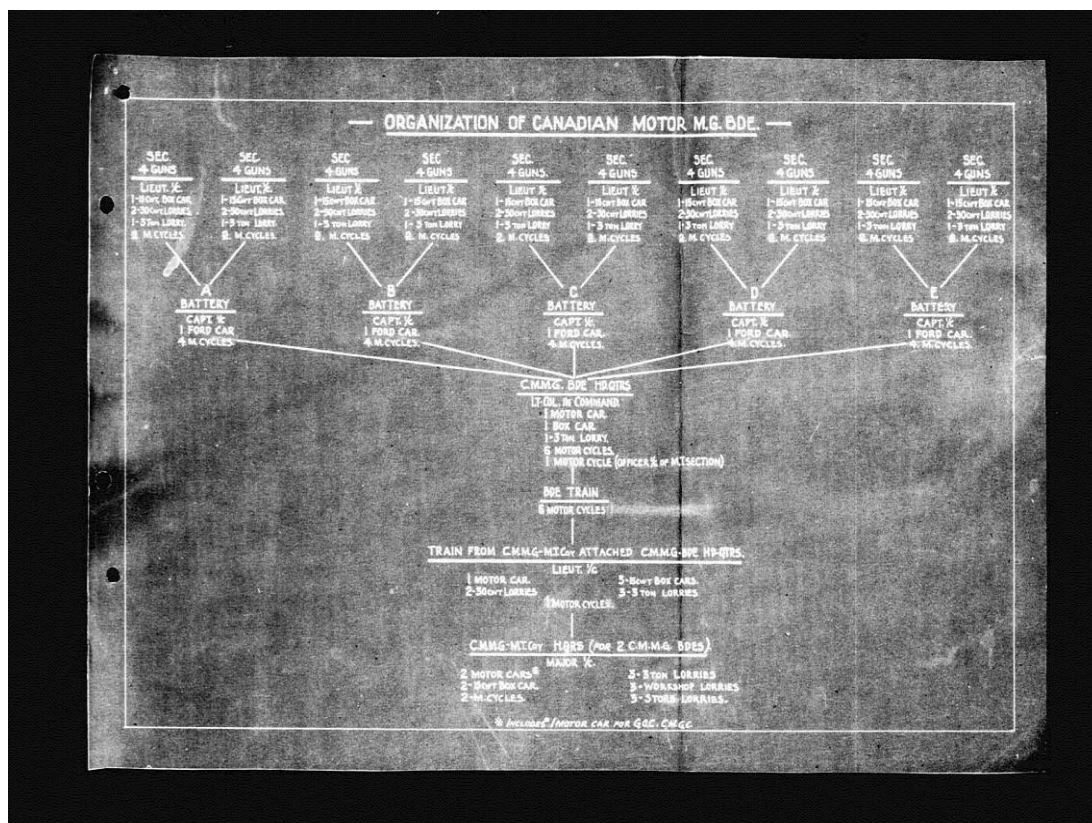


Figure 60: Organisation of the C.M.M.G.B., 1918.  
 Source: <http://data2.collectionscanada.ca/e/e048/e001183943.jpg> (19 Nov. 1914).

The Battle of Amiens on 8 August 1918 began a series of engagements that became known as the 100 Days Offensive.<sup>112</sup> The Allies' aim was to assault the German lines without any let up. The Allies had learned not to continue to attack the one position but to constantly change direction with separate set piece battles. These localised attacks were major battles in themselves, and the Canadian Corps played a full role in their outcome. The attack of Amiens was a complete success for the Allies and General Erich Ludendorff described the first day of the battle as 'the black day of the German Army'.<sup>113</sup> The Canadian Corps was to attack in the centre with three divisions supported by the

<sup>112</sup> As part of the 100 Days Offensive the Canadian Corps fought in the following battles – Battle of Amiens and actions around Damery, 8-17 Aug. 1918, Second Battle of Arras – the Battle of the Scarpe, 26-30 Aug. 1918, and the Battle of Drocourt-Queant, 2-3 Sept. 1918, Battle of the Hindenburg Line – the Battle of the Canal du Nord, 27 Sept.-1 Oct. 1918, and the Battle of Cambrai, 8-9 Oct. 1918.

<sup>113</sup> Duguid, *Official history of the Canadian Forces in the Great War, 1914-1919* (Ottawa, 1938), p. 407. 'August 8th', Ludendorff wrote, 'was the black day of the German Army in the history of this war. German morale had been struck an irreparable blow. "Everything I had feared, and of which I had so often given warning", he declared pessimistically, "had here, in one place, become a reality."'



Australian Corps and III Corps on the left and the French 1<sup>st</sup> Army on the right.<sup>114</sup> The Allies also had three cavalry divisions which were supported by Whippet tanks.<sup>115</sup> Brutinel and his Independent Force were assigned a key role and their task was

to pass through the 3<sup>rd</sup> Canadian Division and make good the line of the Roye road between the red line and the blue dotted line, forming a flank to the 2<sup>nd</sup> Cavalry Division towards the south. As the fight progresses, the Independent Force will continue to exploit success down the Roye road, acting as a link between the most advanced cavalry and leading infantry.<sup>116</sup>

The attack was to be a surprise with no prior artillery bombardment but supported by tanks and a rolling barrage. There was to be close liaison between the Independent Force and the cavalry, and this was entrusted to officers on motor cycles. Particular of this mention was made in the operational orders. The armour car detachments were directed to advance by leapfrogging each other and were to use overhead fire to cover the advance of the machine gun batteries. If the armoured cars were not able to isolate enemy machine gun nests, they were to call forward the mobile mortars. Smoke grenades were to be used to cover the deployment of the mortars.<sup>117</sup> The Lewis guns of the cyclist battalion were to be used against low flying aircraft and the Canadian Corps were allocated a squadron of R.A.F. fighters for close air support. As part of this air ground liaison, the Canadian vehicles were marked with a white band eighteen inches wide stretched across the bonnet.<sup>118</sup> From above, it can be seen that Brutinel was given a wide and varied role in the attack which was quite different from anything that had gone before.

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<sup>114</sup> J.P. Harris, *Amiens to the Armistice: the BEF in the hundred days' campaign 8 August-11 November 1918* (London, 1998), p. 79. According to Harris the attack by III Corps was designed to protect the northern flank and was more limited in scale. III Corps consisted of four British divisions (12<sup>th</sup>, 18<sup>th</sup>, 47<sup>th</sup> and 58<sup>th</sup>) weakened by the recent fighting who faced an attack over more difficult ground.

<sup>115</sup> Travers, *How the War was Won*, p. 118. Haig was particularly interested in having a combined cavalry, Whippet tanks and horse artillery force available for the pursuit and he placed great emphasis on the requirement for the cavalry to stay in touch with the battle.

<sup>116</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix iv).

<sup>117</sup> Ibid.

<sup>118</sup> Ibid.

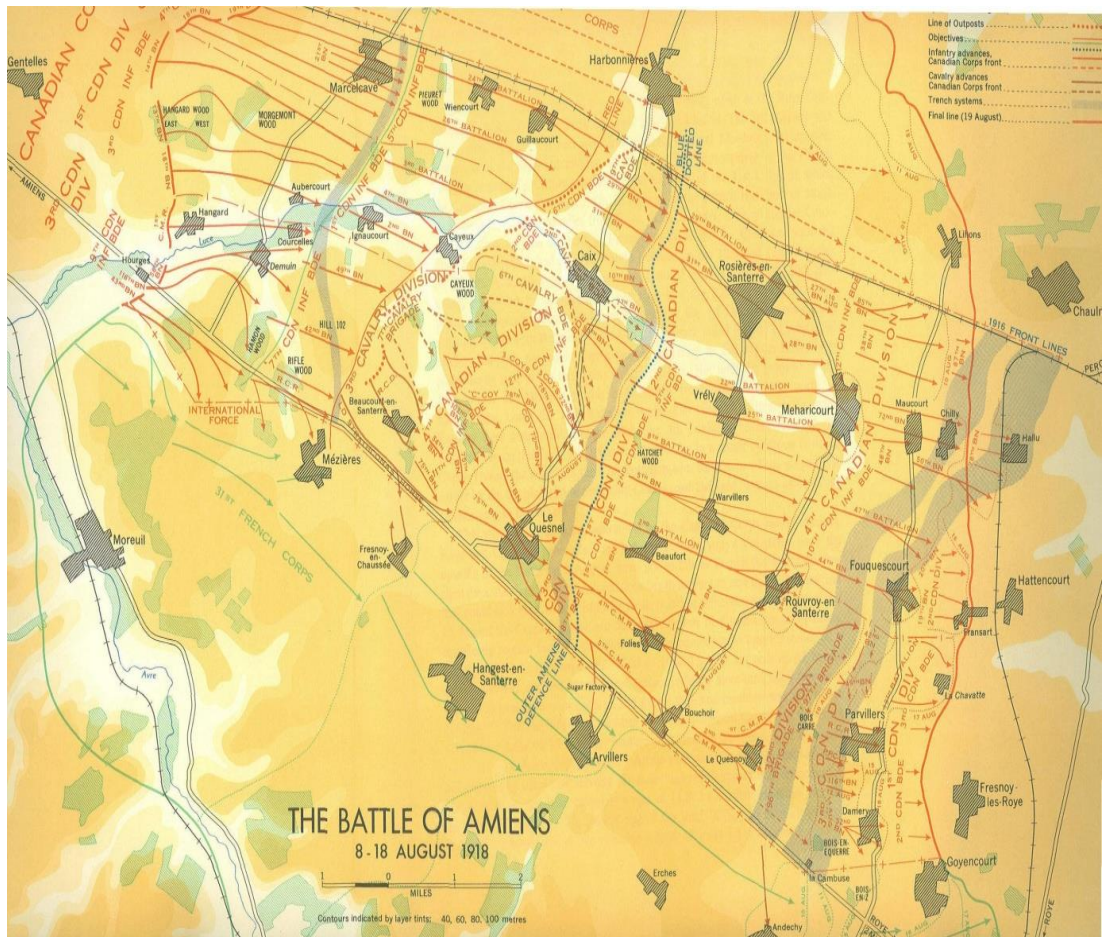


Figure 61: Battle of Amiens, 8-18 Aug. 1918. Note the Canadian Independent Force is described as ‘International Force’.

Source: Nicholson, *Official history of the Canadian Army*.

The Independent Force played a full role on the first day of battle. It achieved all its objectives. Their start time was slightly later than the infantry as they were to advance at the same rate as the French troops.<sup>119</sup> The French were to have a preliminary bombardment as they had no tanks available. Almost at once the plan nearly became unstuck, when the road at Domart was destroyed. Word was sent to the Headquarters of the 4<sup>th</sup> Division requesting the assistance of a tank to drag the armoured cars across the damaged section of the road but on arrival the supply tank was not required and the cars got across themselves.<sup>120</sup> The major problem with the Independent Force was its lack of cross country ability and this was to plague it time and time again. At 11.10 am, Brutinel

<sup>119</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix vi.)

<sup>120</sup> *Ibid.*

received a report from a Captain Clark to the effect that the armoured car detachment was coordinating with Whippet tanks and cavalry around Claude Wood. The trench mortar section was in action with No. 2 Group, when it was used to silence a German battery hidden behind a railway embankment.<sup>121</sup>

The tactical plan seemed to work well. Once the armoured cars came into contact with the Germans they were able to silence them with their machine guns and if unsuccessful the mortars were brought forward. If that did not work the armoured cars were able to outflank them with their mobility.<sup>122</sup> At 1.50 pm Brutinel requested that the Hotchkiss Detachment of the Canadian Light Horse be placed under his temporary command. At 4.00 pm some Whippet tanks destroyed a German anti-tank gun that was holding up the armoured cars.<sup>123</sup> By the end of the day, the Allies had broken the German line and advanced thirteen kilometres. The Germans suffered over 30,000 casualties including a large number of prisoners. The 9 August saw the attack continue. There was less resistance than the first day but the attack fizzled out by the end of the day. The Canadian Light Horse arrived to support Brutinel which gave him added mobility and these extra troops worked well with the machine gunners. The battle ended on 10 August and the casualties for the C.I.F. were four officers and 108 other ranks.<sup>124</sup> The after battle report noted

throughout the whole of the operations platoons of the Canadian Corps Cyclists Battalion screened the advance of machine gun batteries. Their work was carried out in a highly creditable manner. The T.M. Section acted as an independent unit, attached to groups as requested by the tactical situation. The keenness and good work accompanied by this section was most noticeable. The Corps Wireless Section attached to headquarters C.I.F. was invaluable, facilitating the quick forwarding of reports to Canadian Corps Headquarters.<sup>125</sup>

In his notes on recent operations after the battle, Brutinel remarked that the infantry had not yet freed themselves from 'the shackles of trench warfare' and that 'considering the ragged state of the defence our advance was not rapid enough.'<sup>126</sup> He also reported that

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<sup>121</sup> Grafton, *The Canadian "Emma Gees"*, p. 153.

<sup>122</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix vi).

<sup>123</sup> Ibid.

<sup>124</sup> Ibid.

<sup>125</sup> Ibid.

<sup>126</sup> Ibid., Appendix x.

the Independent Force fulfilled its main task to form a flank for infantry and a connecting link between the infantry and cavalry. Furthermore, worked well with the French units by outflanking strong points.<sup>127</sup> The performance of the armoured cars was something Brutinel felt was much too individualistic, and they did not always fulfil their task which was to cover and facilitate the progress of the lorries.<sup>128</sup> The report noted that the mortars had performed well and recommended that more should be provided. There were teething problems with the cyclists but overall they performed well.<sup>129</sup> Brutinel also commented on the performance of the C.M.G.C. and noted that the recent training had stood them in good stead.<sup>130</sup> The machine gun battalion commanders pointed out that the newly found mobility of the machine guns was somewhat wasted due to a lack of quick communications and would need to be addressed.<sup>131</sup>

Not everybody was pleased with the performance of the machine guns of the C.M.G.C. during the Autumn 1918. Brigadier General W. Griesbach, a Brigade Commander, wrote ‘the offensive use of our machine guns still leaves much to be desired. They followed along and took up successive defensive positions... I am of the opinion that having regard for the difficulties of transport and the apparent lack of a definite offensive doctrine, machine guns must be attached to infantry and specific orders given by the infantry commander.’<sup>132</sup> Brigadier General Hugh Clark, Commander of the 7<sup>th</sup> Canadian Infantry Brigade, also complained ‘the machine gunners worked extremely hard and were most willing to undertake all tasks allocated to them. Their defensive tactics were good, but combined training with the infantry is necessary before the best results in offensive tactics can be obtained.’<sup>133</sup> Clark also wanted the machine guns released from the machine gun battalions and allocated back to the control of the infantry brigade commanders. This was a difficult choice to make, as on the one hand it had taken years to develop the optimum organisation for machine guns, that is the machine gun

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<sup>127</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix x).

<sup>128</sup> Ibid. Brutinel noted that ‘one car went cruising all over the country beyond Le Quesnel, returning 4 hours later, when all ammunition had been expended’.

<sup>129</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix x).

<sup>130</sup> Ibid.

<sup>131</sup> Grafton, *The Canadian “Emma Gees”*, p. 157.

<sup>132</sup> Ian M. McCulloch, ‘A war of machines – a re-assessment of the Canadian Machine Gun Corps: innovation or tactical expedient?’ in *Canadian Army Journal*, xi, no.2 (Summer 2008), p. 90 (hereafter McCulloch, ‘A war of machines’).

<sup>133</sup> Ibid.

battalion, but now in the changed circumstances of open warfare, there were calls to reattach the machine guns to infantry battalions. However, this call was rejected and the C.M.G.C. remained intact for the rest of the war. Ian M. McCulloch asserts that there was a reluctance on Brutinel's part to relinquish control of the machine gunners back to the infantry commanders when tactical considerations demanded it.<sup>134</sup> But Brutinel proved that he was quite willing to allow his mobile brigades to be broken up and allocated to the advancing infantry, something that McCulloch ignores.<sup>135</sup> McCulloch further contends that the C.M.G.C. was ultimately flawed in their tactical design during the Hundred Days Offensive. Again this is an unfair criticism as it ignores the work of the C.I.F. which was flexible in how it fought in what was a very short period of time. David Kenyon queries the ability of Brutinel's force during the Battle of Amiens and states that 'its "independence" was also questionable, the unit was not intended to penetrate deeply into the German position, but rather to run up and down the road acting as a flank-guard to the Canadian Corps to the north. He maintains that its role was therefore a strictly limited one, of a specialist character, rather than a step towards genuine mobile warfare.'<sup>136</sup> Kenyon however ignores the training that Brutinel's unit had undergone during the summer which clearly indicates that Brutinel was thinking about mobile warfare.

The officers of the C.M.G.C. realised that there were problems with the machine guns keeping up with the infantry and sought to correct this. The official doctrine stated that batteries, whether in reserve or advancing, should use limbers or pack animals and ought not to be divided into sections while there was a possibility of a continued advance. But this created the sort of problems that Clark and Griesbach complained about, involving reluctance to break up the machine gun organisation and allocate guns locally. Lieutenant Colonel M. A. Scott of the 4th Battalion C.M.G.C., observed that

to properly support the infantry advance, batteries need not follow closer than 1,000 yards in rear of the first wave. Their moves should be by bounds and detailed by the Battery Commander, who will advance with the infantry. When

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<sup>134</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix vi).

<sup>135</sup> War diary, Machine Gun Officer Canadian Corps, Oct. 1918 (L.A.C. Canadian Great War Project, Appendix lxxxv). Brutinel during the 100 Days Offensive was no longer in control of the C.M.G.C., he was C.O. of the Canadian Independent Force so had no authority to split up the machine gun battalions. He led the Canadian Independent Force up until Oct. 1918 when it was disbanded and the mobile units were placed at the disposal of the infantry divisions as the tactical situation changed.

<sup>136</sup> David, Kenyon, 'British cavalry on the Western Front 1916-1918' (PhD thesis, University of Cranfield, 2007) p. 266. (Hereafter Kenyon, 'British cavalry on the Western Front 1916-1918')

the infantry are held up by a point of resistance, they do not require machine gun support if the resistance can be overcome in a short time. From half an hour to an hour is required to determine the situation, by which time batteries can easily come into action at any suitable spot in order to develop superiority of fire.<sup>137</sup>

Scott also thought that as many batteries as possible should remain in Divisional Reserve under orders of the Battalion Commander and that they could be ordered to any part of the divisional area to cover trouble spots.<sup>138</sup> Another officer, Lieutenant Colonel S. G. Watson, commanding the 1st Battalion C. M. G. C., noted the problem of battery commanders trying to liaise with their infantry counterparts and also directing their machine gun units. The solution was to allocate a certain area to advance over and to allow them to use their own initiative in providing fire support on targets coming within range, irrespective of the particular unit in which they were following.<sup>139</sup> Therefore it is clear that machine gun officers sought to rectify the deficiencies that were apparent to them and others. This criticism of the machine gunners by Griesbach and Clark is unfair as they were being blamed for actions outside their control and equally other arms had similar teething problems. It does demonstrate their professional approach in trying to solve these inaccuracies. There are conflicting reports about the training that machine gunners received during the early part of the summer. Certainly, the mobile machine gunners received combined arms training but the rest of the C.M.G.C. received less. The underlying issue was the overall growth in the numbers of machine gunners and the replacement of casualties from the March battles. The replacements were raw recruits who required time to train, which was not available. The training was short and even the 1<sup>st</sup> C.M.M.G.B. only had a couple of weeks training, while the 2<sup>nd</sup> C.M.M.G.B. was only formed in May 1918 and had a small cohort of experienced troops.<sup>140</sup>

Brutinel was reasonably satisfied with the performance, but were others? Currie wrote to Brutinel on 15 August congratulating him and his men on their performance and urging him to note all the lessons learned. He finished by noting that he would be very glad to receive any suggestions or criticisms that Brutinel wanted to bring to his attention.<sup>141</sup> Field Marshal Sir Douglas Haig sent a congratulatory note which stated ‘the gallant and

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<sup>137</sup> Grafton, *The Canadian “Emma Gees”*, p. 155.

<sup>138</sup> *Ibid.*

<sup>139</sup> Grafton, *The Canadian “Emma Gees”*, p. 157.

<sup>140</sup> War diary, Machine Gun Officer Canadian Corps, April 1918 (L.A.C. Canadian Great War Project).

<sup>141</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project, Appendix xv).

skilful co-operation of the armoured cars and motor machine gun batteries is worthy of the highest praise.<sup>142</sup> General Rawlinson praised the work of the units within the Canadian Corps.<sup>143</sup> Brutinel received letters of congratulations from General Mathieu, G.O.C. 126<sup>th</sup> French Division and General Deville, G.O.C. 42<sup>nd</sup> French Division for his role in the Battle of Amiens. In his letter of appreciation, General Mathieu also noted that he awarded six Croix de Guerre to members of the Canadian Independent Force.<sup>144</sup> General Deville, awarded ten Croix de Guerre to members of the Canadian Independent Force and stated that he had mentioned Brutinel in his Divisional history with the following words ‘General Officer of high valour, commanding troops of elite, has shown during the battle of 8<sup>th</sup> August 1918, military qualities of the highest order and has constantly given to the 42<sup>nd</sup> Division of infantry a generous and efficacious support.’<sup>145</sup>

The after-battle reports too were full of praise for the performance of the C.I.F. One contemporary commentator, J.F.B. Livesay, praised the role of liaison between the French and Canadians but conceded that because ‘its operations were necessarily confined to metalled roads, held everywhere in great strength by the enemy, its offensive role was limited.’<sup>146</sup> Livesay did not see anything new in the tactics at Amiens and stated that the Battle of Amiens was merely a return to Byng’s plan adhered to at the Battle of Cambrai in November 1917, but this time he had the resources to exploit the initial success.<sup>147</sup> One of the reasons for the success at Amiens he believed, was the number of tanks available including new Whippets, the availability of the cavalry, and ‘last but not least by the co-operation of the Independent Force under General Brutinel of the Canadian Motor Machine Gun Brigades and cyclists.’<sup>148</sup> C.S. Grafton described the engagement at Amiens and the machine gunners as follows:

The experience had shown that the machine gun battalion was hardly ready for any ‘Hell-for-Leather’ role as many had pictured it from their daily open warfare tactics while at rest behind Vimy during the earlier summer, nor yet was it the

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<sup>142</sup> Field Marshal Sir Douglas Haig to 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 24 August 1918, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 9, File 19)

<sup>143</sup> General Rawlinson to Canadian Corps G.H.Q., 16 August 1918, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 9, File 19)

<sup>144</sup> Letter of thanks from 126<sup>th</sup> and 42<sup>nd</sup> French Divisions, 18 August 1918, (C.W.M., General Sir Arthur Currie Collection Archives,19801226, 58A160.3).

<sup>145</sup> Letter of thanks from 126<sup>th</sup> and 42<sup>nd</sup> French Divisions,18 August 1918, (C.W.M., General Sir Arthur Currie Collection Archives,19801226, 58A160.3).

<sup>146</sup> Livesay, *Canada’s Hundred Days*, p. 89.

<sup>147</sup> Ibid.

<sup>148</sup> Ibid.

immobile, heavily-laden, plodding arm it had been when paced to slower infantry advances of set-piece attacks. It had struck a fair balance between the two schools.<sup>149</sup>

Contemporary writers were full of praise for the conduct of the mobile brigades and recognised it for what it was. The first battle in which this new structure was deployed had gone reasonably well but it was realised that more could be done. These contemporary commentators were aware that Brutinel had brought something new to the battlefield.<sup>150</sup> Paddy Griffith referring to Brutinel's Force and Lindsay's Force maintains that 'as a milestone in conceptual development their creation must surely stand every bit as high as the original founding of both the Machine Gun Corps and the Tank Corps themselves.'<sup>151</sup> Immediately after the battle Brutinel was once again training his troops and on 12 August, he developed a new tactical plan to 'practice methods of overcoming strong points by combination action of fire by machine guns and the use of smoke.'<sup>152</sup> Haig was satisfied with manner in which the British forces performed at Amiens and noted the role of the cavalry as a breakout force. Like 'Brutinel's Force' he wanted the cavalry augmented with a brigade of infantry mounted in buses and supported by motorised machine gunners.<sup>153</sup> According to Simon M. Justice, the British Official Historian, Brigadier General Sir Edmonds dismissed the contribution of the Cavalry Corps to actions before the Selle in October 1918 as largely irrelevant.<sup>154</sup> However, Justice disputes this and demonstrates that in fact the Cavalry Corps played an important role in the action.<sup>155</sup> Justice maintains Haig made a personal contribution to this use of cavalry in proposing that a training exercise be held for the Cavalry Corps with the aim of honing their skills in the 'pursuit'.<sup>156</sup> This exercise, held on 17 September 1918, and for the exercise the Cavalry Corps had the 17<sup>th</sup> (Armoured Car) Tank Battalion and

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<sup>149</sup> Grafton, *The Canadian "Emma Gees"*, p. 155.

<sup>150</sup> Ibid.

<sup>151</sup> Griffith, *Battle tactics of the Western Front*, p. 129.

<sup>152</sup> War diary: Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>153</sup> Gary Sheffield and John Bourne (eds.), *Douglas Haig: war diaries and letters, 1914-1918* (London, 2005), p. 449. 25 August 1918.

<sup>154</sup> Simon M., Justice, 'Behind the lines: Sir Douglas Haig and the Cavalry Corps, September- October 1918, in Sheffield, Gary and Peter Gray, *Changing war the British Army, the hundred Days campaign and the birth of the Royal Air Force, 1918* (London, 2013) pp 111-124. Hereafter referred to as Justice, 'Behind the lines: Sir Douglas Haig and the Cavalry Corps, September- October 1918'

<sup>155</sup> Ibid., pp 111-124. Justice demonstrates quite clearly that the Cavalry Corps played a key role in this campaign.

<sup>156</sup> Ibid., p. 114.



Household Machine Gun Brigade attached. These units had been part of the Canadian Independent Force for the action around Cambrai in early September 1918. Brutinel had been disappointed with the performance of the 17<sup>th</sup> (Armoured Car) Tank Battalion and felt they needed more training.<sup>157</sup> The training exercise was a success and it was noted that the ‘closest co-operation between Armoured Cars and Cavalry is necessary.’<sup>158</sup> The Cavalry Corps went on to play an important role in the campaign. The use of the Cavalry Corps during this period in combination with mobile machine guns was very similar to what Brutinel was trying to achieve in the Canadian Corps.

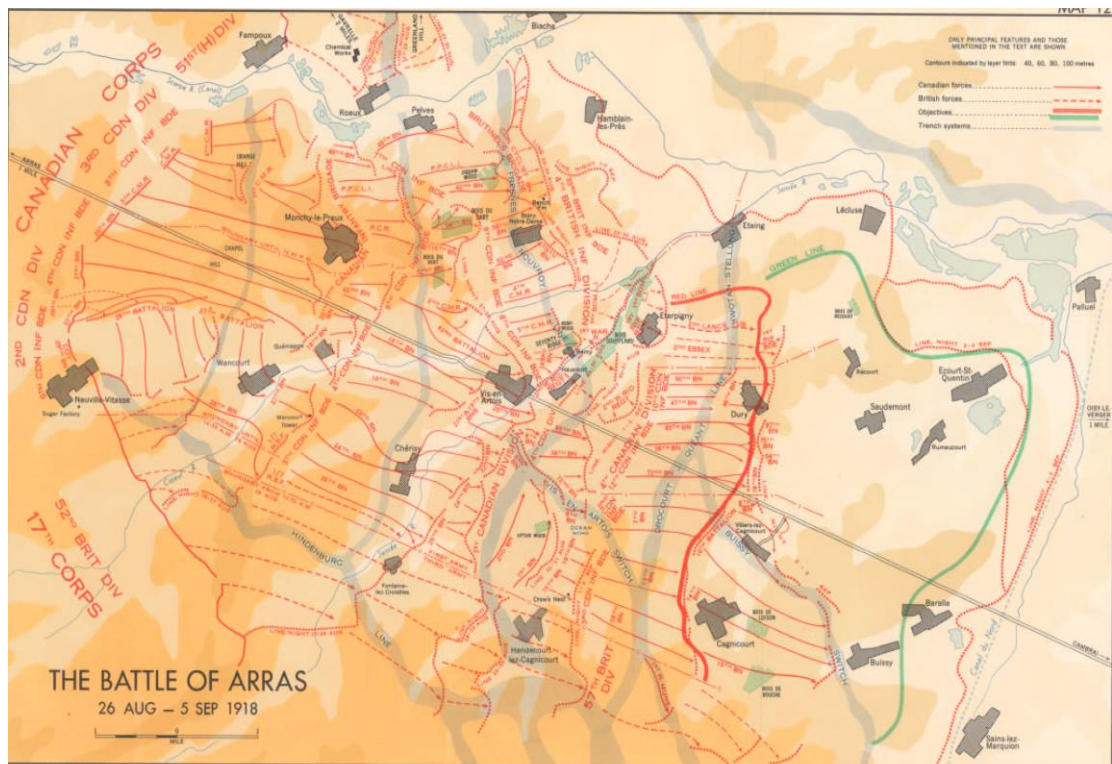


Figure 62: The Battle of Arras. Note Brutinel’s Force to the north acting as a flanking force. Source: Nicholson, *Official history of the Canadian Army*.

The attack was renewed on 26 August around the city of Arras, in what became known as the Battle of the Scarpe. The attack was preceded by a machine gun barrage of eighty guns, one gun per every thirty-five yards. The Canadian Independent Force was

<sup>157</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (L.A.C. Canadian Great War Project).

<sup>158</sup> Justice, ‘Behind the lines: Sir Douglas Haig and the Cavalry Corps, September- October 1918’ p. 117.

reconstituted under the command of Brutinel with the following troops 1<sup>st</sup> and 2<sup>nd</sup> C.M.M.G.B., Canadian Corps Cyclist Battalion, 18<sup>th</sup> Corps Cyclist Battalion. They also had some British troops transferred to the force. The 1<sup>st</sup> Life Guards Battalion which had recently been converted to motorised machine gunners was placed under the command of Brutinel. The Life Guards were commanded by Colonel Lindsay D.S.O. as already highlighted in this study who had contributed so much to machine gun doctrine over the years.<sup>159</sup> Brutinel and his force were ‘to proceed at once down Cambrai road and exploit success.’<sup>160</sup> Over the next couple of days various cavalry units were placed under Brutinel’s command as the tactical situation changed, including at one stage the 10<sup>th</sup> Royal Hussars. The going was tough for the first few days as the armoured cars struggled to get through the frontline trenches, but finally they achieved success. On 29 August the C.I.F. was renamed Brutinel’s Force and ordered to provide flank cover for the British 11<sup>th</sup> Division to the north of the Scarpe. On 31 August six armoured cars from the 17<sup>th</sup> (Armoured Car) Tank Battalion were added to his force.<sup>161</sup> This enhanced force, known as the Composite Force, was given the task on 2 September of advancing as rapidly as possible, seizing the bridge at Marquion, and establishing a bridgehead astride the Cambrai road.<sup>162</sup> Once the bridgehead was secured by infantry, the Force was to continue towards Cambrai. If the bridge could not be captured, the Force was to harass the retreating Germans on the far side with barrage fire. The plan explained that in order ‘to give necessary freedom of manoeuvre for the above tasks, special restrictions will be placed on heavy artillery fire; these will be justified in due course.’<sup>163</sup> The war diary, however, noted that the mission had failed.<sup>164</sup>

In his after-action report, Brutinel described what happened and offered a reason for the failure. The infantry assault was checked at about 9.30 am which was the time for the C.I.F. to move forward, but the force was too timid and cautious in its attack. By the time the attack was resumed, the Germans had brought up reinforcements and stopped the infantry advance. This had the knock-on effect of forcing the C.I.F. to miss their

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<sup>159</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>160</sup> Ibid.

<sup>161</sup> For a film clip of the Austin armoured cars and Autocars of the C.I.F. advancing past a line of captured Germans see [http://www.criticalpast.com/video/65675027525\\_British-officers\\_pass-on-vehicles\\_soldiers-on-motor-bikes\\_soldiers-on-horses](http://www.criticalpast.com/video/65675027525_British-officers_pass-on-vehicles_soldiers-on-motor-bikes_soldiers-on-horses).

<sup>162</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>163</sup> War diary, Machine Gun Officer Canadian Corps, Aug. 1918 (L.A.C. Canadian Great War Project).

<sup>164</sup> Ibid., Sept. 1918 (L.A.C. Canadian Great War Project, Appendix A).

objectives. Brutinel was disappointed with the performance of the 10<sup>th</sup> Hussars and described the 17<sup>th</sup> (Armoured Car) Tank Battalion armoured cars as too inexperienced.<sup>165</sup> He thought that the C.I.F. was a well-balanced force with sufficient firepower to overcome any patchy resistance and should be able to hold ground until the arrival of the infantry. However, it had only been put together twenty-four hours before Zero day, so had not yet had time to bond and 'its elements were not endowed to an equal extent with the boldness and resolution which should characterise such a force.'<sup>166</sup> In order to address this failure, Brutinel recommended that any mobile independent force should be a permanent force and that they would achieve a better result than a large body of cavalry.<sup>167</sup> He outlined the composition of any future force as follows

- 4 squadrons of cavalry
- 1200 cyclists
- 2 batteries field artillery
- 2 sections trench mortars mounted on lorries
- 2 motor machine gun brigades
- 8 armoured cars (belonging to the brigades)
- 1 signal section<sup>168</sup>

Brutinel believed that this type of force should have enough mobility and fire power to increase the depth of future attacks.<sup>169</sup> Combined training was key to the successful development of this 'force of opportunity' where each unit would learn its strengths and limitations.<sup>170</sup> These operational reports can be interpreted as mere excuses for tactical failure or they could be seen as an attempt to adapt quickly this new form of warfare. This idea of holding ground was a key concept that John Henry Parker had developed nearly twenty years previously and was the forerunner to the idea of an armoured division. Brutinel was striving to develop a balanced force that would contain all the requisite arms and be a self-contained fighting unit, although he was not yet convinced that it could operate as a breakthrough force. That phase of the battle would have be left to the

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<sup>165</sup> Ibid.

<sup>166</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (L.A.C. Canadian Great War Project).

<sup>167</sup> Ibid.

<sup>168</sup> Ibid.

<sup>169</sup> Ibid.

<sup>170</sup> Ibid.

infantry. The success of Brutinel during this period was due to his relationship with Currie who encouraged him in his work and gave him a certain amount of free rein.<sup>171</sup>

Brutinel was constantly endeavouring to seek improvements and like any good commander was continually pushing his subordinates. In an after-battle report about the Battle of the Scarpe in September, he berated Colonel W.K. Walker, commander of the 1<sup>st</sup> C.M.M.G.B. Brutinel wrote to him and explained that he was unhappy with the performance of the forces under Walker and whom he criticised as he did not ‘fight and manoeuvre your group as a group, but rather dealt out separate tasks to batteries.’<sup>172</sup> Brutinel was highly critical of Walker for yielding captured ground unnecessary on 3 September and using the trench mortars in the wrong tactical manner. He thought that the armoured cars had fought without any definite instructions and reiterated the principle that in the employment of armoured cars, they had to precede and support the bringing into action of the machine gun batteries in a moving battle.<sup>173</sup> According to Brutinel there were deficiencies in the tactical handling of liaison, communications and scouting. He finished by remarking that he would ‘be very glad if you set to work and by constructive criticism and judicious training you turn into profitable account the mistakes which have occurred.’<sup>174</sup> He was taking on board Currie’s advice to strive for continued improvement. Throughout the fighting of this period, Brutinel was constantly trying to improve the use of the Newton trench mortars. While generally satisfied with their deployment, he was confident that the addition of lighter ammunition to increase the range to about 2,000 yards would be beneficial and stressed that smoke ammunition should also be carried.<sup>175</sup>

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<sup>171</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Currie wrote about Brutinel and his command of the C.M.M.G.B. that ‘in times of action he fights it.’

<sup>172</sup> *Ibid.*, Appendix iii.

<sup>173</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (L.A.C. Canadian Great War Project). Appendix iii.

<sup>174</sup> *Ibid.*, Appendix iii. At this stage of the war Walker was a highly decorated officer and had just received the Croix de Guerre at the Battle of Amiens.

<sup>175</sup> *Ibid.*, Appendix vi.

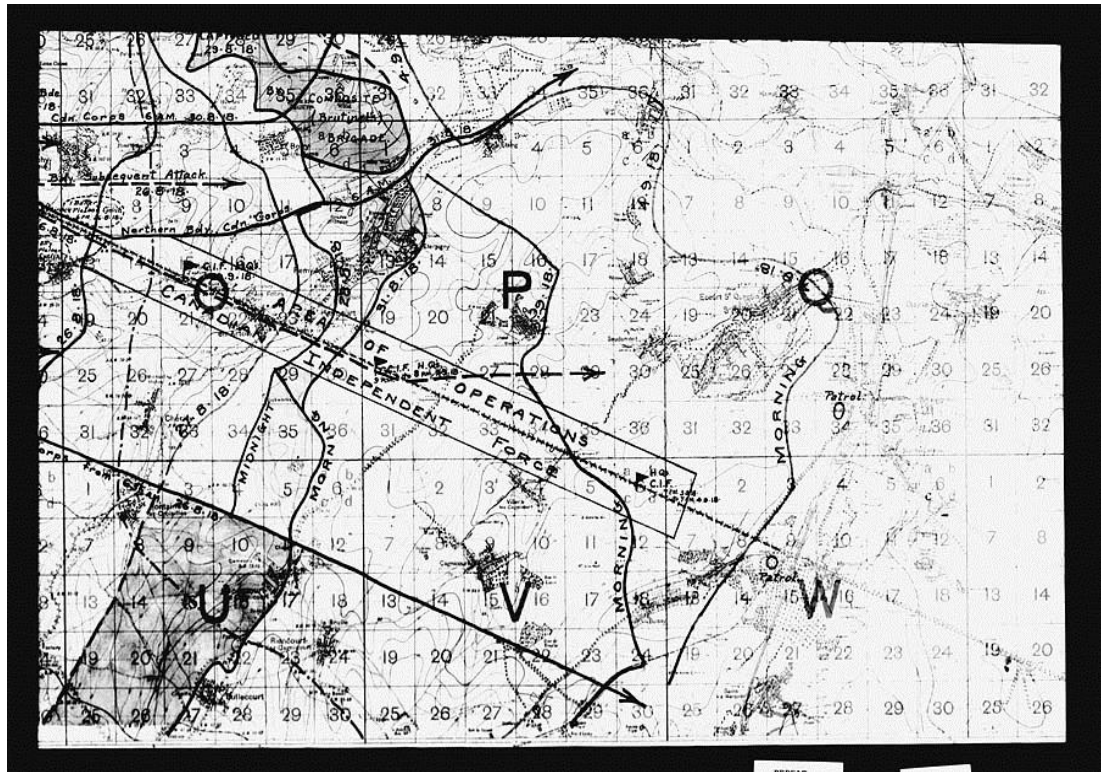


Figure 63: Map of area of operations for Canadian Independent Force around Arras.  
 Source: <http://data2.collectionscanada.ca/e/e048/e001183715.jpg> (19 Nov. 1914).

As part of the Battle of Drocourt-Queant Line in early September 1918, Brutinel was ordered to cooperate with Lindsay's Brigade, a similar type unit to his own under the command of Colonel George Lindsay.<sup>176</sup> Lindsay's Brigade and a cavalry brigade was detailed to push through the final Blue line, if a breakout was achieved by the Canadians and seize crossings over the Canal de l'Escault. In the event, the Blue line was not reached. General Horne, commander of the First Army, had been sufficiently impressed by Brutinel's Brigade that he allowed his senior machine gun officer George Lindsay to establish a similar unit.<sup>177</sup>

Brutinel's Brigade was officially sanctioned on 19 September 1918.<sup>178</sup> Comprising motor machine gunners, cyclists, motorised mortars, the Canadian Light Horse and whenever possible a battery of field artillery, the brigade was under the direct

<sup>176</sup> Ibid., Appendix iii. Lindsay's Brigade consisted of two machine gun battalions, eight armoured cars, one cyclist battalion and one battery of trench mortars with motor transport. Griffith, *Battle tactics of the Western Front*, p. 129.

<sup>177</sup> H.S. Horne to G.H.Q. 6 Sept. 1918, Formation of mobile Machine Gun Brigade, 20 Sept. 1918 (B.T.M., Lindsay Papers E2004.2369.E2). For Horne's endorsement of Brutinel see pages 187-9 and the discussion of the establishment of Lindsay's Force.

<sup>178</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (L.A.C. Canadian Great War Project, Appendix iv)

instruction of the Corps H.Q. and was to carry out the following tasks: at the commencement of offensive operations to thicken up the initial machine gun barrage, when the fight becomes fluid, the brigade will push forward with the view to seizing tactical features and hold them until the arrival of the infantry. Once open warfare was achieved, the Brigade was to act as 'protective mounted troops' and as an advance guard for the Corps.<sup>179</sup> David Kenyon mentions that Lieutenant Colonel F. H. D. C. Whitmore G.O.C. 10<sup>th</sup> Hussars (part of Brutinel's Independent Force) voiced concerns about the role of his unit in this operation and felt that it could not work properly due to the narrow front of the advance and problems with artillery coordination.<sup>180</sup> Kenyon then uses this evidence to criticise Brutinel's unit making the point that just because it was established as a mobile force did not mean that the conditions for its use were present in the latter stages of the war.<sup>181</sup> He further points out that while Haig laid out a vision for a mobile war of pursuit with units such as these this never really came about.<sup>182</sup>

For the assault on the Hindenburg line and the attack on the Canal du Nord on the 26 September, Brutinel ordered a machine gun barrage of 192 guns.<sup>183</sup> This was now standard practice across the whole of the British Army. Brutinel's Brigade was given the task of crossing the Canal de l'Escault in the vicinity of Cambrai and if possible exploiting along the Cambrai – Valenciennes road.<sup>184</sup> Depending on the level of resistance, the brigade was to advance to the Canal du Nord and cross over temporary bridges but without interfering with the flow of artillery ammunition. A special artillery programme was designed to give Brutinel's Brigade support in the attack and he also had a battery of field artillery for direct support. Heavy artillery support could also be called upon by wireless but the orders noted that this would require one hour to organise.<sup>185</sup>

For the assault on Cambrai on 8 October 1918, the 2<sup>nd</sup> and 3<sup>rd</sup> Canadian Divisions were to secure a bridgehead over the Canal de l'Escault and capture the town.<sup>186</sup> Brutinel was given a simple order 'to take advantage of any opening during the second phase to

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<sup>179</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (L.A.C. Canadian Great War Project, Appendix iv).

<sup>180</sup> Kenyon, 'British cavalry on the Western Front 1916-1918' p. 266-7.

<sup>181</sup> *Ibid.*, p. 267.

<sup>182</sup> *Ibid.*

<sup>183</sup> *Ibid.*, Appendix xiii.

<sup>184</sup> *Ibid.*

<sup>185</sup> *Ibid.*,

<sup>186</sup> War diary, Machine Gun Officer Canadian Corps, Oct. 1918 (L.A.C. Canadian Great War Project, Appendix lxxxv).

exploit the success.<sup>187</sup> By 15.25 on the first day, a temporary bridge at Pont d'Aire was ready and the 1<sup>st</sup> C.M.M.G.B. and the C.C.B. crossed over to exploit any weakness in the German defences. The fighting was intense over the next couple of days. There were a lot of small fire fights with isolated pockets of German machine gun nests but these were dealt with by a combination of machine gun fire and mobile mortars.<sup>188</sup> Brutinel reported four officers killed, six wounded, twelve other ranks killed and eighty-three wounded at the end of the fighting.<sup>189</sup> Once through the German lines at Cambrai, the advance continued on a wide front. The Allies were determined not to allow the Germans to regroup and form new defences. With that in mind, Brutinel's Brigade was disbanded and the mobile machine gunners were placed at the disposal of the infantry divisions.<sup>190</sup> They were tasked with reconnaissance in force and especially to capture bridges.<sup>191</sup> One bridge was captured over the Canal de l'Escaut by two armoured cars on 22 October where they held off a sizeable force of Germans for four hours before being reinforced by the 52th Battalion hence allowing the advance to continue.<sup>192</sup> Brutinel's Brigade was disbanded, not because of failure but for tactical reasons. The components of the Brigade were needed at divisional level where they could give the best result.

The 10 November 1918 saw the Canadian Corps just outside the town of Mons and on the last day of the war they paraded through the town.<sup>193</sup> Brutinel's Force or the Canadian Independent Force performed well during the 100 Days Offensive. It had managed to do so despite the creation of a second C.M.M.G.B. in early summer, limited training and an ever changing unit composition. Moreover, it showed that a new type of all arms warfare was possible and this was a credit to Brutinel.

Between 8 August and 11 November the following were captured by the Canadian Corps: 31,537 prisoners, 623 guns (heavy and field), 2,842 machine guns, 336 trench mortars (heavy and light). Over 500 square miles of territory and 228 cities, towns and villages had been liberated, including the cities of Cambrai, Denain, Valenciennes

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<sup>187</sup> Ibid.

<sup>188</sup> Ibid.

<sup>189</sup> Ibid.

<sup>190</sup> Ibid.

<sup>191</sup> Ibid.

<sup>192</sup> Ibid.

<sup>193</sup> A film clip of the parade can be viewed at <http://www3.nfb.ca/ww1/postwar-film.php?id=531538> which shows elements of Brutinel's Force, the armoured cars, the cyclists and light cavalry.

and Mons.<sup>194</sup> C.S. Grafton recorded the growth of the Canadian Machine Gun Corps from humble beginnings in 1915 as follows

<b>Date</b>	<b>Officers</b>	<b>Other ranks</b>	<b>Total</b>
June 21, 1915	24	567	591
March 31, 1917	182	3,192	3,374
November 11, 1918	422	8,349	8,771

He also noted that over 16,000 troops served in the C.M.G.C., with 5,777 casualties. This is a casualty rate of 36% which was much higher than either the Canadian infantry or artillery.<sup>195</sup>

Attempts were made to develop other forms of mobile warfare by adding Whippet tanks to cavalry.<sup>196</sup> The problem with mixing cavalry and tanks was the different speeds at which they operated. Whippet tanks could still only travel at eight miles per hour and on multiple occasions were outdistanced by the accompanying cavalry. Under fire, the cavalry was not able to advance with the tanks, resulting in a disjointed force. However, the official history of the C.E.F. did report that in certain instances medium tanks and armoured cars were able to carry out independent offensive actions with success.<sup>197</sup> Stephen Badsey noted that while the Cavalry Corps was interested in working with Whippet tanks as a replacement for their pack mounted machine guns, their after-action report from the Battle of Amiens reported that ‘the use of Whippet tanks is in its infancy, and if successful co-operation is to be achieved, both must train and practice together.’ Apparently the Tank Corps report did not mention anything about cavalry.<sup>198</sup>

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<sup>194</sup> Grafton, *The Canadian “Emma Gees”*, p. 212.

<sup>195</sup> *Ibid.*, p. 214.

<sup>196</sup> Kenyon, ‘British cavalry on the Western Front 1916-1918’ p. 255-60. See pages 255-60 for an analysis of the combining of cavalry and Whippet tanks during the latter stages of the war.

<sup>197</sup> Nicholson, *Official history of the Canadian Army*, p. 420. Nicholson recorded an incident when armoured cars, exploiting success on the Australian front, shot up an advanced corps headquarters and captured the German defence plan for 25 miles of the Hindenburg Line.

<sup>198</sup> Badsey, *Doctrine & reform*, p. 296.



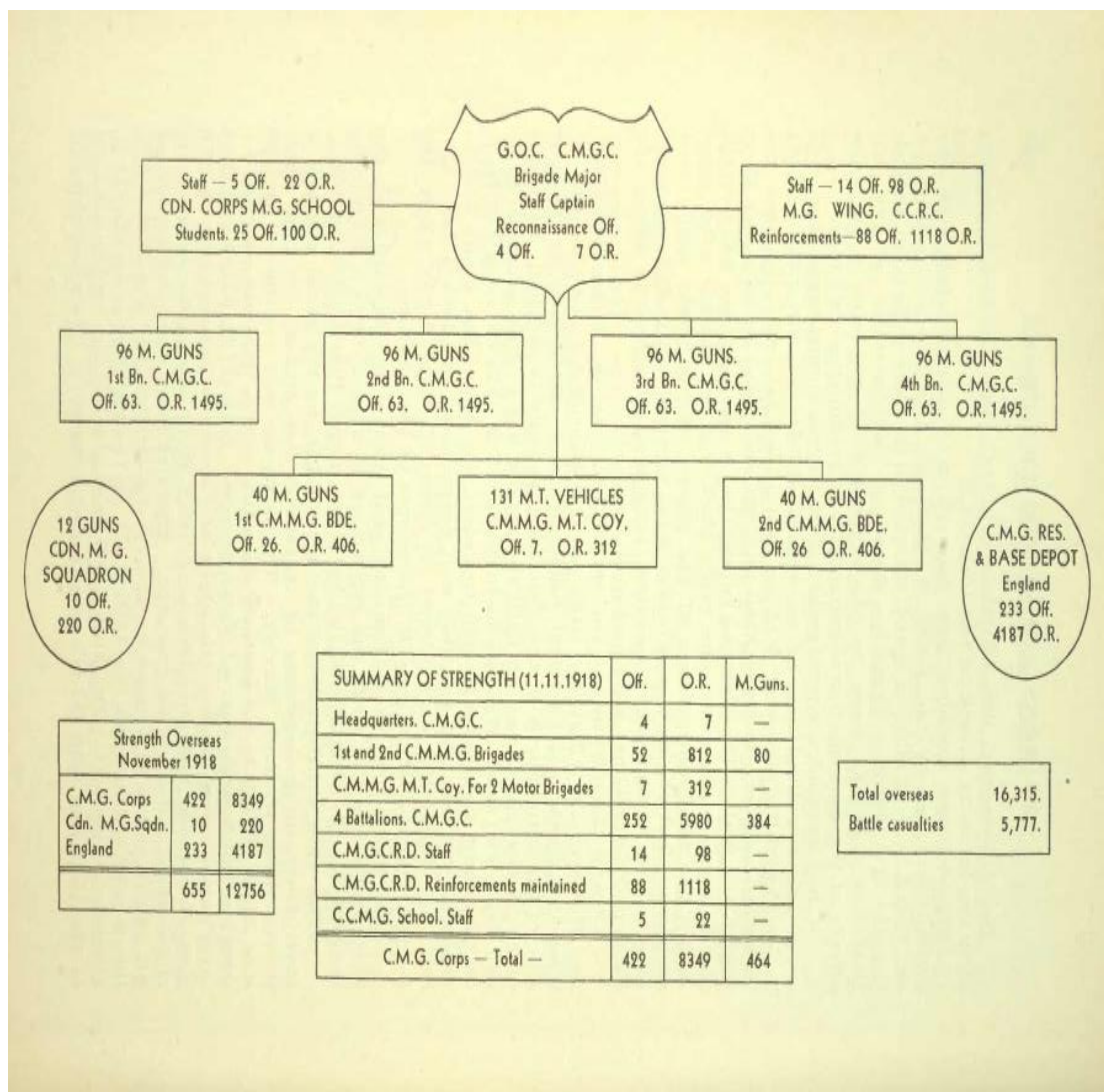


Figure 64: Organisation chart, C.M.G.C., 1918.  
Source: Grafton, *The Canadian "Emma Gees"*, p. 204.

Brutinel achieved a much better mix of troops when he created the Independent Force. While other attempts had been made to develop mobile forces the best solution was to add artillery using mobile mortars. The Allies at this stage of the war were able to adapt quickly and use ad hoc units like Brutinel's force. The latter was based around the various mobile machine gun units, the Autocars armoured cars, and represented the culmination of the work of Brutinel. It was the ideal unit to fight a semi-open warfare. The question arises as to how successful it was during this period.

It was unique and it did achieve a certain level of success. Critics of the unit tend to allow too little for the fact that it was new, cobbled together quickly and that it used inadequate and obsolete equipment. It was however praised by senior leaders, as might be expected, and it was recognised as a unique and different innovation that gave a foretaste

of future war that is a mobile war.<sup>199</sup> Brutinel's Brigade was constantly changing its formation, and yet it still performed well. It needed to be a separate force and given specific tasks otherwise it could not have functioned properly. It was very effective as a flanking force and this was recognised by Currie. The leadership of the Canadian Corps should be praised for instigating such a force. In April/May 1918 when the Allies backs were to the wall, Currie set in train new tactical schemes which had a far reaching consequence in the final phase of the war. This was helped by the fact that the Canadian Corps was a permanent unit during the war, which retained the same H.Q. staff, unlike British Corps whose components constantly changed. Therefore, these senior officers developed the experience of working well together which allowed them to develop units like Brutinel's Force.<sup>200</sup> Gary Sheffield noted this trend in the Canadian Corps, which allowed them to build on this continuity to develop Standard Operating Procedures between units and individuals.<sup>201</sup> He also makes the point that Dominion forces could concentrate and specialise due to their size and structure while the British had to spread their resources thinly in support of the total British Army.<sup>202</sup>

Whereas Brutinel retired from the army, Lindsay remained part of the British Army and became a key contributor to the development of armoured warfare. When events did not work out as expected, Brutinel was quick to adapt tactics and strived for continuous improvement. The fact remains that the 100 Days Offensive was a short period in which to judge Brutinel's Brigade. It was never a complete all arms unit, but it did demonstrate the potential for such and when the motorised units improved its cross country ability, it would prove its worth in the next war. These motor machine gun units were not breakout forces nonetheless they certainly demonstrated that once through the front lines they could sustain themselves effectively. They were able to operate as self-

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<sup>199</sup> Pulsifer, 'Canada's first armoured unit' p. 51. Haig was impressed with the 1<sup>st</sup> C.M.M.G.B. during March and said that the 'work of the 1st C.M.M.G. Brigade in recent operations has proved the value that can be obtained from such units, and recommends the formation of a 2nd Brigade be undertaken forthwith.' Field Marshal Sir Douglas Haig to 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 24 August 1918, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 9, File 19) Haig also sent a congratulatory note to Brutinel after the Battle of Amiens which stated 'the gallant and skilful co-operation of the armoured cars and motor machine gun batteries is worthy of the highest praise.'

<sup>200</sup> John R. Grodzinski, "We few, we happy few...": Canadian generalship in the First World War', *Canadian Military Journal* (Autumn 2006), p. 80.

<sup>201</sup> Gary, Sheffield, 'How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918' in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000). p. 126.

<sup>202</sup> *Ibid.*, p. 127.

contained units and could combine different weapons systems efficiently. They had a certain amount of combined training and this stood to them better than the other arms. They adapted quicker than other units who to a certain extent only had one way of operating. They won praise for their ability to operate independently and were used in that role as part of the 100 Days Offensive. Tim Cook maintains that the Canadian Corps was fortunate in that throughout the war, it enjoyed a numerical strength and a stability that British units could not match. Following on from other Canadian historians (Bill Rawling, Shane Schreiber) there is a suggestion that there is evidence here for a Canadian way of war which General Currie alluded to in 1918 when he observed ‘This is a job which must be done, and the more we learn about killing Germans the sooner peace will be declared and the sooner we can get back to Canada, therefore, we study our job thoroughly, and in the execution of our plans nothing is left to chance.’<sup>203</sup> Brutinel and his machine gunners played a crucial role in this Canadian way of war.

Simon Robbins has pointed out the role General Sir Henry Horne played in contributing to the reputation of the Canadian Corps.<sup>204</sup> Horne’s B.G.G.S., Lieutenant General Sir Hastings Anderson, wrote that ‘the just fame of the Canadians’ and ‘the prominence rightly given by the Canadian press to their prowess, tended to obscure the part played by Lord Horne as an Army commander in directing, guiding and combining with the work of other Corps, the operations in which they participated,’ and were ‘behind this confusion as to the respective positions of Horne and his Canadian Corps.’<sup>205</sup> Robbins believes that it was Horne who provided the operational framework which allowed the Canadian Corps to flourish.<sup>206</sup> He further asserts that Horne and Currie employed similar operational techniques and worked in close partnership.<sup>207</sup> They both began their careers as artillerymen. Horne shared Currie’s long-standing policy of paying the price for victory in shells and not in the lives of men.<sup>208</sup> Horne supported Currie’s

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<sup>203</sup> Tim Cook, *Shock troops: Canadians fighting the Great War, 1917-1918, volume two* (Toronto, 2008), p. 405. Gary, Sheffield, ‘How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918’ in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000). P. 126. Gary Sheffield acknowledges that the Canadian Corps developed a distinctive ‘way of warfare’.

<sup>204</sup> Robbins, *British Generalship during the Great War: the military career of Sir Henry Horne, 1861-1919* p. 287.

<sup>205</sup> *Ibid.*

<sup>206</sup> *Ibid.*

<sup>207</sup> *Ibid.*, p. 289.

<sup>208</sup> *Ibid.*

innovative use of aircraft, machine guns and tanks, which could be used to overcome the German defences and save lives.<sup>209</sup> Horne and Currie were advocates and also masters of the set piece battle employing an efficient all-arms doctrine using massive artillery support. This concept relied on close co-operation between artillery, infantry and tanks and set limited objectives with the aim of avoiding outdistancing the artillery support. These operations took the form of a series of inter linked set pieces launched as one operation with the aim of reducing the rate of exhaustion amongst the infantry and maintaining the moving forward of the artillery. This type of operation, was used by the Canadian Corps to capture Bourlon Wood in September 1918.<sup>210</sup>



Figure 65: Canadian Motor Machine Gun Brigade waiting alongside Arras–Cambrai Road, Sept. 1918.

Source: Films of the Canadian experience in the Great War.

Brutinel and his machine gunners came to the fore during 1918. In the Spring battles the C.M.M.G.B. was used successfully as a strategic reserve in support of the British Fifth Army. Based on this success, Brutinel got sanction to create a second motor machine gun brigade in the Canadian Corps and was also able to persuade the British high command to

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<sup>209</sup> Ibid.

<sup>210</sup> Ibid.

create five motorised machine gun battalions for their own use.<sup>211</sup> In April 1918, while the Allies were fighting against renewed German assaults, Brutinel was training his forces in open warfare tactics. These new all arms units were used successfully in the 100 Days Offensive starting on 8 August 1918.

Brutinel's success was in part due to the innovative culture that prevailed within the Canadian Corps and this fits into the idea of military culture as described by Williamson Murray. Brutinel worked closely with the British officer George Lindsay and their collaboration worked as a form of horizontal innovation along the lines proposed by Robert Foley. Throughout the war Brutinel was able to conceive, develop and establish some major innovations in the sphere of machine gun doctrine which greatly assisted the Allied armies in achieving victory, namely barrage fire, early mobile warfare and the C.M.G.C.

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<sup>211</sup> War diary, Machine Gun Officer Canadian Corps, May 1918 (L.A.C. Canadian Great War Project).

## CHAPTER SEVEN: INNOVATION AND MACHINE GUNS IN THE FIRST WORLD WAR

During the past year the use of the machine gun in offensive warfare has been considerably extended. The machine gun barrage has taken a definite place with the artillery barrage in covering the advance of our infantry while the lighter forms of machine guns have proved of great assistance in the capture of hostile strong points. Douglas Haig <sup>1</sup>

As this study has shown, there were a variety of innovation, of different degrees in the use of machine guns in the First World War. As the conceptual framework for this study is military innovation, this chapter discusses the principal theories of military innovation with a view to relating these specifically to the development of machine gun doctrine during the Great War. Since military innovation studies began in the late 1980s when Stephen Rosen and Barry R. Posen proposed ideas for how to investigate military innovation and develop new theories, others notably Theo Farrell have also developed ideas in this field.<sup>2</sup> According to Robert Foley, there are main four schools of thought how armed forces innovate. The first was enunciated by Barry R. Posen in *Sources of military doctrine: France, Britain and Germany between the wars*: he argued that it was the interaction between civilian and military leaders that created military innovation.<sup>3</sup> Posen believed that a strong civilian leadership could force a mainly conservative military to face new challenges and threats.<sup>4</sup> These civilians need the help of officers whom he refers to as military ‘mavericks’ to supply them with the military expertise that they lack. Together, they drive change.<sup>5</sup> Stephen P. Rosen challenged that asserting that it was not civilian intervention that drives innovation but rather certain senior officers, who recognise new threats and engage in ideological struggle with fellow officers to have

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<sup>1</sup> J. H. Boraston (ed.), Sir Douglas Haig; despatch of 25 December 1917, p. 140.

<sup>2</sup> Barry R. Posen, *The sources of military doctrine: France, Britain, and Germany between the world wars* (New York, 1984). (hereafter Posen, *The sources of military doctrine*) Stephen Peter Rosen, *Winning the next war innovation and the modern military* (New York, 1991). (hereafter Rosen, *Winning the next war innovation and the modern military*) Farrell, Theo, Terriff, Terry, *The sources of military change culture, politics, technology* (London, 2002). (hereafter Farrell, Terriff, *The sources of military change culture, politics, technology*)

<sup>3</sup> Posen, *The sources of military doctrine*

<sup>4</sup> Foley, ‘A case study in horizontal military innovation’, p. 808.

<sup>5</sup> Posen, *The sources of military doctrine*, pp 224-26.

their view heard.<sup>6</sup> The third school of thought, represented by Theo Farrell and Terry Terriff, argued that military innovation is in fact the result of organisational culture and the internal norms and values of an organisation determine how successful it can innovate. They also see military institutions as being conservative and needing bold leadership to change.<sup>7</sup> Lastly, Adam Grissom has developed an idea that military innovation can occur as a bottom-up process. This, he maintains, can frequently occur in wartime as junior officers in the field develop novel tactics to deal with new situations. These new tactics, if successful, can be codified and accepted as new doctrine.<sup>8</sup> While G. C. Wynne, Timothy T. Lufper, Bruce I. Godmundsson similarly subscribe to this notion of bottom-up innovation, this is the inverse to the hypothesis of Rosen, Posen, Farrell and Terriff all of whom regard innovation as a top-down process.<sup>9</sup> While different in their approaches, a common theme flows through all four of these schools of thought, namely the control importance of personalities be they military or civilian, in the innovation process.

Adam Grissom's idea of bottom-up innovation will be examined in the context of contribution to machine gun doctrine made by Brutinel, Lindsay and Applin. The work of Robert Foley will be assessed with specific reference to the idea of horizontal innovation advanced by Lindsay while he was working at the Small Arms School in Camiers. Barry R. Posen's idea that civilian intervention in military affairs drives innovation will be tested in relation to machine guns, by exploring the relationships between Theodore Roosevelt and John Henry Parker, between David Lloyd George and George Lindsay, and between Raymond Brutinel and Sir Clifford Sifton. Stephen P. Rosen has argued that the culture of an organisation can be key in facilitating innovation and this manifests itself in the form of strong leaders encouraging people to develop new ideas. The accuracy of this contention will be assessed by studying Haig's attitude to machine guns. The concept of cultural innovation advanced by of Theo Farrell and Terry Terriff will be explored in relation to the work of Brutinel and his Canadian machine gunners. Adam M. Jungdahl and Julia M. Macdonald identified the concept of gatekeepers as inhibitors of military innovation which will be examined with reference to General Pershing and his ideas of

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<sup>6</sup> Foley, 'A case study in horizontal military innovation', p. 800.

<sup>7</sup> Ibid.

<sup>8</sup> Grissom, 'The future of military innovation studies', p. 917.

<sup>9</sup> Foley, 'A case study in horizontal military innovation', p. 802.

machine guns in the A.E.F. Barry R. Rosen's idea of intra-service rivalry within a service will be discussed in relation to Brutinel and McNaughton striving for scarce resources within the Canadian Corps.

#### HORIZONTAL INNOVATION AND THE WORK OF THE SMALL ARMS SCHOOL AND LINDSAY

Of particular reference to this is Robert Foley's notion of horizontal innovation in the German Army during the Battle of the Somme in 1916. This was a grassroots attempt by the Germans to learn in the field to counteract the new tactics of the Allies. The German Army used 147 divisions during the battle and suffered over 450,000 casualties.<sup>10</sup> Most divisions could only survive two weeks in the trenches before being withdrawn to recuperate and re-equip. This exposed most of the German officer corps to this experience and resulted in the production of a multitude of 'experience reports'. At first these were passed on by battalion commanders to their successors, but within weeks the process of handover detail became codified.<sup>11</sup> Because of the large rotation of troops in and out of the battle, the Germans developed a more elastic type of command. German regiments consisted of three battalions in the front line, positioned in depth. The first regiment held the front line followed by the second regiment immediately behind and the third regiment held out of range of Allied artillery. As troops moved backwards and forwards, commands became mixed up and the Germans decided to leave the officers in the front line commanding all regimental troops, not just their own. Consequently, the front line commander had a better understanding of the tactical situation.<sup>12</sup> These new developments were codified and passed around among the rotating German divisions until eventually became accepted as official doctrine by the German High Command.<sup>13</sup> All of this happened between July and November 1916.

This horizontal innovation allowed the German army to develop new defensive tactics to hold the Allies in situ on the Western Front for four years. However, there were several factors which facilitated this. Foley maintains that a weak central doctrine

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<sup>10</sup> Foley, 'A case study in horizontal military innovation', p. 810.

<sup>11</sup> Ibid., p. 810.

<sup>12</sup> Ibid., p.812.

<sup>13</sup> Ibid.



development system within the German army created the ideal opportunities for this type of horizontal innovation to flourish.<sup>14</sup> Also the average German officer was educated to a high military standard and taught to apply his judgement to battlefield conditions. The German Staff system also contributed to this phenomenon in that staff officers were expected to do their job but not to seek the limelight. Therefore, the authors of these new doctrines never accepted credit for the lessons learned reports, as a consequence the doctrine was more readily accepted by their colleagues than might otherwise have been the case.<sup>15</sup> Given the coincidence of a related weak official doctrinal system and this upsurge in independent thinking, not surprising individual German officers sought to develop new tactics.<sup>16</sup> Not all of these innovations were accepted or implemented. While recommendations for new weapons and force structure were made, it was not always possible for these to be acted upon. Horizontal innovation has its limitations. While potentially quicker to implement on the ground, its main drawback is that junior officers cannot develop new weapon systems or change the composition of units. During the Battle of the Somme, the German High Command embraced a lot of this horizontal innovation and which became bottom-up innovation.<sup>17</sup>

There are similarities between what was achieved by the Germans through horizontal innovation and the kind of innovation that George Lindsay was providing to his fellow officers from his base in the Small Arms School in Camiers. His work came to the attention of officers in the field who corresponded with him and reported on their experiences. A French officer, Lieutenant Ricoux, was especially interested in the methods of indirect fire employed by ‘our allies, the English’. He wrote: ‘I went yesterday on a study trip to the front where I saw the English regulations in the hands of Lieutenant Beurieux,’ and he asks if Lindsay could send him the regulations.’<sup>18</sup> Another French officer, Jean le Bobinner, writing to thank Lindsay for sending him regulations, and mentioned that the tactical regulations had already been translated into French.<sup>19</sup> Another officer, Captain Boffy, writing in August 1917, mentioned that he had the honour of visiting Lindsay’s school. Lindsay replied to his letter sending him a copy of

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<sup>14</sup> Ibid.,

<sup>15</sup> Ibid.,

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.,

<sup>18</sup> Bundles of letter from foreign officers to whom I sent SS.192. (B.T.M., Lindsay Papers. E.2004.2007.C.45).

<sup>19</sup> Ibid.

SS192 and stated that he looked back with great pleasure at the time that Boffy and his colleagues of the Machine Gun Service of the French Army spent with him at Camiers.<sup>20</sup> He also mentioned that he had received letters both from them and from many other machine gun officers of the French Army since that time and that these gave him great pleasure as they demonstrated the strong bonds of sympathy that had developed between the Machine Gun Services of British and French Armies.<sup>21</sup> A Brigade Machine Gun Officer, Roland C.W. Burn, wrote to Lindsay from Gallipoli, offering his notes about the campaign.<sup>22</sup> Lindsay did not reply to Burns but he did reference the letter in correspondence with J.C. Wedgwood who replied 'that letter from Gallipoli is excellent.'<sup>23</sup> During his time at the Small Arms School, Lindsay also corresponded with Major George P. Lathbury who served time in Egypt and Lieutenant Colonel Geoffrey Howson and Ernest Carnochan of the Indian Army. The correspondence was mostly routine, detailing requests for information.<sup>24</sup> An American officer, Captain Castle came to visit the Machine Gun School at Grantham in April 1916 when America was still neutral. Afterwards he corresponded with Lindsay who provided him with information covering the establishment of the Machine Gun Corps.<sup>25</sup>

Furthermore there are many instances of officers in the field writing to Lindsay to ask his advice and to also recount their experiences in the belief that it could shape official doctrine. This correspondence came from various ranks and from different theatres of war. Some of the advice was heeded and followed, and some was politely refused. This type of unofficial communications could be conducted through social contacts by officers who had served in regiments, public schools or staff colleges together. An example of this occurred when an officer, Major General Henry de Beauvoir de Lisle, serving in Gallipoli, wrote to General Hamilton in 1915 and noted

Heard last night from my old Bde Machine Gun officer, Captain McGillicuddy, 4<sup>th</sup> D[ragoon] G[uards], who is now Assistant Instructor at the GHQ Machine Gun School, France. He has worked out my idea of MG Indirect Fire and sent me

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<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

<sup>22</sup> Letter to Captain Lindsay from R.C.W. Burn, Bde. M.G.O., Gallipoli, 6 November 1915 (B.T.M., Lindsay Papers. E.2004.1772).

<sup>23</sup> Further letters from Commander Wedgwood, 18 Dec. 1915 (B.T.M., Lindsay Papers E.2004.1801.B.18).

<sup>24</sup> Letters to and from Howson, Malley, Ernest A. Carnochan (India), George P. Lathbury (Egypt) and George Lindsay showing liaison kept up with those places (B.T.M., Lindsay Papers E.2004.2738.H.3).

<sup>25</sup> Letters from Captain Castle, 27 Apr. 1916 (B.T.M., Lindsay Papers E.2004.1957.C.24).

his circulars. I consider them so valuable that I enclose them for your information. You may consider the advisability of a MG School here.<sup>26</sup>

Other officers within the Machine Gun Corps corresponded with each other and sometimes wrote to professional acquaintances rather than the officer commanding. Such social interaction was quite common. Some information gathering was conducted by Lindsay and his team on a more formal basis and in one instance resulted in a new manual being produced in July 1915.<sup>27</sup>

How Lindsay corresponded with officers within the Allied Armies is interesting to note. His personable approach allowed him to spread his ideas informally. His correspondence with French officers demonstrated that they were approaching him directly as the expert and not through official channels. As service schools were established in France, teaching all sorts of specialities, the nature of their dissemination of information changed in that it became more formal. However, Lindsay, was effective in disseminating his doctrine through official and unofficial channels rather like the mechanism for propagating horizontal innovation that Foley discussed. As official schools were established doctrine, began to be developed and published in the name of the General Staff. Circulated as top-down instructions this was sometimes viewed as over the top by the troops.<sup>28</sup> Although Paddy Griffith views the analysis by Lindsay and Baker-Carr of machine gun tactics in 1915 as merely an attempt to establish their school credentials and impress their rivals, he does attribute Lindsay success in teaching machine gun doctrine to his 'raw talent combined with deep inner conviction about how machine guns should be organised.'<sup>29</sup> This conviction is evident in Lindsay's approach to propagating his machine gun doctrine. By adopting a form of horizontal innovation his ideas spread among officers of the same rank on a parallel plain. Furthermore, it is significant that Anglo-French liaison within the 32<sup>nd</sup> Division was encouraged along similar lines to Lindsay's contacts.

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<sup>26</sup> Fox-Godden, "Putting knowledge in power", p. 87. Major McGillicuddy served in Grantham with Lindsay and was transferred to France at the same time as Lindsay. They were identified as two of the better machine gun instructors in Grantham. See Notes on conference in General Whigham's room, 1916 (B.T.M., Lindsay Papers B.60).

<sup>27</sup> Consolidated report on replies received in questionnaire sent out to every battalion in B.E. forces, Nov. 1915 (B.T.M., Lindsay Papers A.29). Twenty-eight replies of variable sophistication were received and a report was compiled from the findings. These questionnaires were then codified and published as *Notes on the employment of machine guns and the training of machine gunners* in July 1915.

<sup>28</sup> Griffith, *Battle tactics on the Western Front*, p. 187.

<sup>29</sup> *Ibid.*, p. 190.

Officers were told to keep in contact with their French counterparts with whom they had previously trained in order to maintain the flow of innovative ideas concerning tactical development. This was to be done by private correspondence with officers whom they had previously met.<sup>30</sup> Other similar collaborations took place throughout the army. When he served as GSO 2 with 50th Division, Major General Sir Charles Bonham-Carter introduced some new tactics with regard to machine guns. He established a zone of fire with his brigade machine guns and sited them sufficiently far from the front line to reduce exposure to enemy artillery fire. He claimed that this system was adopted throughout the army and he would receive visits from other divisions eager to learn.<sup>31</sup> He recalled in his memoirs: ‘I must confess that I was pleased when staff officers were sent from other HQs to find out what we were doing.’<sup>32</sup>

Lindsay, Brutinel and Applin were all very keen to disseminate their knowledge to others. Applin was a noted lecturer which is probably why he was transferred to the US.<sup>33</sup> Lindsay as head of the Small Arms School in Camiers was responsible for training machine gunners and all machine gunners arriving in France were required to pass through its doors. As already stated there were two main machine gun schools at Grantham and Camiers and these were responsible not only for training but also for developing new doctrine. The schools were no different to the plethora of specialist schools that were introduced across the British army. Paddy Griffith notes that establishment of these specialists schools and the huge output of training manuals made a significant contribution to overall victory.<sup>34</sup> The establishment of the machine gun schools were no different to other arms. They all trained their recruits in their specialist skill.

The machine gun schools at Grantham and Camiers also served the Dominion forces. As already mentioned there were problems for the Dominion forces that visited them but these were overcome and the relationship worked out well.<sup>35</sup> The benefit of a small number of schools was that a consistent approach could be applied to teaching

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<sup>30</sup> Mitchell, ‘An inter-disciplinary study of learning in the 32<sup>nd</sup> Division on the Western Front, 1916-1918’, p. 97.

<sup>31</sup> Paul Martin, Harris, ‘The men who planned the war a study of the staff of the British Army on the Western Front 1914-1918’ (PhD thesis, King’s College London, 2013) p. 184.

<sup>32</sup> Ibid.

<sup>33</sup> Applin, *Across the seven seas*, p. 266.

<sup>34</sup> Griffith, *Battle tactics of the Western Front*, p. 191.

<sup>35</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 22.

about the deployment of machine guns. Even still this did not always work. Sometimes this could be that fault of the staff who knew little about machine guns. According to Griffith, Brigadier General H.R. Cumming was appointed to run the Machine Gun Training Centre at Grantham in 1917 in order to rest him after the Battle of Bullecourt.<sup>36</sup>

The idea of special machine gun schools was taken up by the French and the Americans. John Henry Parker established a machine gun school for the A.E.F. at Fort de Peigney in France, in December 1917.<sup>37</sup> R.V.K. Applin helped establish the American Machine Gun Training Centre at Camp Hancock in Augusta, Georgia in early 1918 on the same basis as Grantham. These centralised machine gun schools in France functioned at the corps level whereas a lot of the infantry schools were operated at a lower divisional level. This had the effect of delivering a more consistent uniform training to a larger number of the troops who passed through them. On being appointed to the post of Inspectorate of Training, in Spring 1918, Lieutenant General Sir Ivor Maxse set about rationalising the number of schools in the army and imposing a uniform standard of training across the services.<sup>38</sup> This work took most of 1918 to accomplish and it was only finished in the last months of the war. The machine gun training structure was not changed under Maxse's direction which suggests that it was deemed suitable.

Horizontal innovation aided the dissemination of machine gun doctrine throughout the British Army during 1916-18. As commander of the Small Arms School Lindsay was able to use his formal and informal contacts to develop and redistribute new innovative doctrine throughout the army in a very efficient manner.

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<sup>36</sup> Griffith, *Battle tactics of the Western Front*, p. 190.

<sup>37</sup> *United States Army in the World War, 1917-1919, general orders, GHQ, AEF* (vol. 12-15, Washington, 1988), xiv, 353. Parker was awarded the Army Distinguished Service Medal for his work at the Army Machine Gun School. <http://militarytimes.com/citations-medals-awards/recipient.php?recipientid=15686> (31 Oct. 2011). The citation reads

‘As an Instructor at the Army Machine-Gun School at Langres, by his tireless efforts Colonel Parker secured the necessary equipment and ably instructed a large student body in the technical handling of one of the most important fire power weapons developed in the present war, rendering services of great value to the American Expeditionary Forces.’

<sup>38</sup> Griffith, *Battle tactics of the Western Front*, pp 184-191.

## CULTURAL MODEL OF INNOVATION – BRUTINEL AND HIS CANADIANS

The cultural model of military innovation is also pertinent to this study. Theo Farrell asserts that it is the culture of an organisation that can influence military innovation in several ways. He defines culture as ‘inter subjective beliefs about social and natural world that defines actors, their situations and the possibilities of action.’<sup>39</sup> For Williamson Murray, ‘military culture can be defined as the sum of the intellectual, professional and traditional values possessed by an officer corps and it allows the senior leadership to assess the external environment and response to treats’.<sup>40</sup> Planned changes of culture can lay the groundwork for a shift in the officer mind-set hence allowing innovation to take place. External shocks can also supply the impetus to change. Farrell states that the development of anti-militarist culture arose in Germany and Japan after both suffered utter destruction in the Second War.<sup>41</sup> Also transnational professional military culture can, if nurtured correctly, provide the ideal fallow ground for innovation to take place.<sup>42</sup> When this model is applied to the case the First World War, it is hard to see the culture of the British and French Armies allowing innovation to take place. David Lloyd George as Minister of Munitions perceived the army as rigid and limiting. He wrote: ‘Its methods allowed no play for initiative, imagination and inventiveness’, while ‘the men on the heights offered no encouragement or chances to genius down below’<sup>43</sup> This rather skewed, self-serving opinion of a politician needs to be taken with a degree of scepticism. Nevertheless, he was correct in observing that militaries are rigid and bound by tradition and rules.

One of the most prolific writers about military innovation, Williamson Murray stresses that military organisations rarely learn from past conflicts; in fact they go out of their way to study what they feel comfortable with. This has the effect of forcing them to

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<sup>39</sup> Theo Farrell and Terry Terriff, *The sources of military change: culture, politics, technology* (London, 2002), p. 7. (Hereafter Farrell, Terriff, *The sources of military change: culture, politics, technology*.) Drawing on case studies from Ottoman Turkey and Meiji Japan, the development of a two-front war doctrine in America, the impact of the invention of the tank on the British military, Russian military response to the collapse of their country’s economy.

<sup>40</sup> Williamson Murray, ‘Innovation: past and future’ in *Joint Force Quarterly*, no. 2 (Summer 1996), p. 55.

<sup>41</sup> Farrell, Terriff, *The sources of military change: culture, politics, technology* p. 7

<sup>42</sup> Adam Grissom, ‘The future of military innovation studies’ in *Journal of Strategic Studies*, xxix, no. 5 (Oct. 2006). p. 917 (hereafter Grissom, ‘The future of military innovation studies’).

<sup>43</sup> Fox-Godden, “‘Putting knowledge in power’”, p. 96.

re-learn (in combat) lessons presented themselves at the end of the previous conflict.<sup>44</sup> This contention is certainly true in the case of machine guns given that the lessons that were available prior to the war were largely ignored. Murray emphasises that during the inter war period, the most successful militaries were those who encouraged debate, studied and held frank experiments in their preparations for war.<sup>45</sup> He also cautions that culture which plays a key role in innovation is often overlooked by historians.<sup>46</sup>

Murray has identified factors that have led to successful innovation during the inter war period. The first was specificity, which means that in each case of successful innovation that Murray examined there was a specific strategic military problem to overcome.<sup>47</sup> The Germans faced a similar specific strategic problem which led them to armoured warfare and close air support. Murray believes that an organisation's culture plays a big part in allowing innovation to take place. According to Murray military culture is shaped by several factors. He highlights how the burden of past plays a significant role, acting as an omnipresent block to change.<sup>48</sup> Past wars give rise to successful traditions that can be very hard to change especially in peacetime. While it is very rare for a military organisation to start with a clean slate, this is what happened with the German Army after the First World War. They had the opportunity to conduct a frank and honest assessment of their performance during the war, and could develop new doctrine free from the trappings of the past. The Canadian Expeditionary Force had a similar freedom in 1914, uninhibited by any preconceived ideas of warfighting, when developing its doctrine during the war. The Canadians had the luxury of being part of the British Army. Therefore they were familiar with doctrine yet sufficiently independent to develop new ideas.<sup>49</sup> Brutiuel and his machine guns were a key part of this independent process.

The contrast between the British Army and the C.E.F. during the First World War was stark. The C.E.F. grew out of a small militia force which had few full-time staff

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<sup>44</sup> Williamson, 'Thinking about innovation', pp 122-3. Murray references the Royal Navy and its anti-submarine tactics which it developed during the First World War yet by the start of the Second World War had to relearn them.

<sup>45</sup> Ibid., p. 125.

<sup>46</sup> Ibid., p. 125.

<sup>47</sup> Ibid., p. 311. Murray is referring to the development of carrier aviation by the U.S. Navy and amphibious warfare by the U.S. Marine.

<sup>48</sup> Ibid.

<sup>49</sup> Pugsley, *The ANZAC experience*, p. 195. Pugsley makes the point that while the Canadians used the same tactics as the British, it was the homogeneous nature of the Canadian Corps which allowed Currie to adopt new doctrine based on best practice from within the corps itself and the wider British Army.

officers. As the C.E.F. grew from one division in 1914 to the biggest corps in the British Army in 1918, the number of senior officers expanded. John Grodzinski credits Arthur Currie with creating an efficient staff which meant that new tactics and procedures were adopted quickly.<sup>50</sup> Currie was noted for encouraging subordinates to use their initiative which cultivated an atmosphere in which ideas flowed upwards from below. According to Grodzinski this occurred with artillery under the guidance of McNaughton and machine guns under the leadership of Brutinel. Engineering units were reformed to the extent that maximum military effectiveness was achieved: this resulted in reduced casualties.<sup>51</sup> A Canadian officer, Frederic Franklin Worthington, wrote about the major influence that certain Canadian officers had during the First World War. In an interview for Canadian radio recorded in 1964 and entitled 'Flanders Fields' he recalled

Officers like Currie, McNaughton and Brutinel and Morrison and others recognized that firepower had to be mastered and then employed to economize manpower, and that the infantry could be used for something else than cannon-fodder.<sup>52</sup>

In 1916, after the Battle of Mount Sorrel, Currie complimented Brutinel, and gave him a relatively free rein in establishing the Canadian Machine Gun Corps.<sup>53</sup> While Brutinel is recognised as the main driver in this development, Currie played a key part. In effect, he acted as the liberator of Brutinel's inventive spirit. This follows upon Rosen's idea of the post of visionary senior military figure who, with their own ideas for innovation, promote like-minded subordinates.<sup>54</sup> Currie used his rank and authority to defend officers like Brutinel and McNaughton which enabled them to innovate free from obstruction. Brutinel's skills and ideas were recognised, resulting in his rapid promotion.<sup>55</sup> His ideas were readily adopted and became so successful that they spread across the rest of the British Army. This dissemination across the British Army was aided by Lindsay. The correspondence

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<sup>50</sup> John R. Grodzinski, 'We few, we happy few...': Canadian generalship in the First World War', *Canadian Military Journal* (Autumn 2006), p. 80.

<sup>51</sup> Ibid. p. 80.

<sup>52</sup> Canadian Broadcasting Corporation Digital Archives Flanders Fields radio programme, Canadian Broadcasting Corporation Digital Archives, 1964 transcript, Worthington 11/23 Worthington rose to the rank of Major General in World War Two after establishing the Canadian armoured forces in 1936.

<sup>53</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 16.

<sup>54</sup> Rosen, *Winning the next war*, pp 134-43.

<sup>55</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Currie submitted a glowing reference about Brutinel to Canadian GHQ in April 1918 seeking to have him promoted to Brigadier General.



between Brutinel and Lindsay demonstrates that there was what Theo Farrell terms transnational learning taking place.<sup>56</sup> This was conducted very much on their own initiative.<sup>57</sup> It was not formalised nor did not come about from official channels. Rather it was something that evolved from self-interest. Lindsay and Brutinel prioritised disseminating their ideas above career advancement. Lindsay in his role as chief instructor of Camiers developed multiple contacts with officers in the field and claimed that he knew everything that was going on within the Machine Gun Corps.<sup>58</sup> This allowed him to develop new doctrine efficiently and he used Brutinel to sound out ideas. They maintained a two-way correspondence and were never overly protective of their ideas.

The use of machine gun conferences as instigated by Brutinel was certainly innovative and was an initiative taken up by Lindsay. Brutinel began these corps-based conferences in late 1917 and by early 1918, he was asked to expand these meetings to army wide scale. Brutinel reported on the conferences in monthly reports which he submitted to the General Staff of the Canadian Corps.<sup>59</sup> These conferences and resulting reports heralded the start of developing new machine gun doctrine as they sought to introduce best practice across the divisions of the Corps.<sup>60</sup> Lindsay then took this innovation when he was appointed D.I.M.G.U. of the First Army, and organised a series of conferences beginning in May 1918 for all the British Armies, including the machine gun schools in Grantham and Camiers.<sup>61</sup> The spread of Brutinel and Lindsay's ideas could be described as a form of horizontal innovation. While ultimately published as top-down under the auspices of the General Staff, it had evolved as a horizontal process between the two officers. Because the C.E.F. never published its own doctrine, the part played by Brutinel is somewhat lost to history.

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<sup>56</sup> Grissom, 'The future of military innovation studies', p. 917.

<sup>57</sup> For examples of their correspondence, see chapter four of the thesis on Lindsay and 'the influence of Brutinel on British doctrine and relations with Lindsay', pages 113-18.

<sup>58</sup> Correspondence concerning relations between Grantham and Camiers, 8 Nov. 1917 (B.T.M., Lindsay Papers E.2004.1998.C.40).

<sup>59</sup> War diary, Machine Gun Officer Canadian Corps, Jan. 1918 (Canadian Great War Project, Appendix 5). The Jan. 1918 meeting of D.M.G.O.s was attended by twelve officers of the British 1<sup>st</sup> Army from 1<sup>st</sup> Portuguese Division, 46<sup>th</sup> Division, 1<sup>st</sup> Canadian Division, 2<sup>nd</sup> Canadian Division, 3<sup>rd</sup> Canadian Division, 4<sup>th</sup> Canadian Division, 11<sup>th</sup> Division, 31<sup>st</sup> Division, 42<sup>nd</sup> Division, 62<sup>nd</sup> Division. Some of the topics that they dealt with were the issues of tracer bullets and armour piercing bullets for use against aircraft and a new belt filling machine.

<sup>60</sup> Ibid.

<sup>61</sup> G.H.Q. machine gun conferences, 17 May 1918 (B.T.M., Lindsay Papers E.2004.2107.D.19).

Aimée Fox-Godden has noted that the British Army looked to civilian experts to fill skill gaps and had patrons to protect them.<sup>62</sup> This took the form of leading businessmen and experienced engineers being appointed to key military roles to perform similar tasks, examples are railroad executives being tasked to develop railroad infrastructure in France.<sup>63</sup> This involvement of civilians being appointed to military roles also happened within the Canadian Corps. The Canadians (on mobilisation) accepted men perceived to have relevant skills and allowed them relatively free rein. Brutinel described the type of officer that joined the CEF as ‘brim full of intelligent initiative, almost entirely free of red tape and of preconceived ideas, they soon mastered the art of fighting in whatever specialty they were concerned. They were impatient of the conditions under which they were fighting and began to look for ways and means to break local stalemates and in many ways they did’.<sup>64</sup> Brutinel’s innovative role in developing the C.M.M.G.B. was a direct result of the support that he received from Currie. Currie was an enthusiastic supporter of Brutinel and supported him throughout his career. In a letter to Canadian G.H.Q. in March 1918 Currie called for Brutinel to be promoted to the rank of Brigadier General to command the newly reorganised C.M.G.C. Currie wrote

I know of no General Officer in the Military Forces of Canada, whether he is serving in Canada, England, or France, who has done more in this war than the above mentioned officer[Brutinel]. He came to France as Lieut. Colonel, and has served here continuously since. He is largely responsible for the evolution, which has taken place in machine gun tactics. He has been constantly in demand by the French Military authorities to lecture to them, and the British Army has adopted the Canadian machine gun organisation. Further-more Lieut. Colonel Brutinel is responsible for the administration of the Machine Gun Corps and as intimated above, in times of action he fights it. When one considers the work involved in handling these troops tactically and seeing that they are constantly supplied, one is forced to the conclusion that if ever there was a Brigadier-General’s command this is one.<sup>65</sup>

The latter fits into the Murray’s idea of a leader developing the correct culture to allow innovation to take place. Another commander might not have been so forthcoming.

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<sup>62</sup> Fox-Godden, “Putting knowledge in power”

<sup>63</sup> Ibid.

<sup>64</sup> ‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade’, 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 8.

<sup>65</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2).

Another idea that Murray developed was revolutionary innovation. In preparing for the next conflict, armies train, equip and develop innovative new ideas.<sup>66</sup> According to Murray this innovation can take different forms. Revolutionary innovation occurs in a top-down direction, whereby the leadership is well informed about the technical as well as the conceptual aspects of the particular innovation. This occurred in the R.A.F. during the 1930s under the direction of Air Chief Marshal Sir Hugh Dowling, who pushed for high speed fighter aircraft and radar.<sup>67</sup> This innovation helped Britain win the air war during the Battle of Britain. A similar top-down approach obtained in the case of the French High Command during the same period, though with the opposite result led to their developing the disastrous doctrine of ‘methodical battle’ which allowed them to be easily overrun by the Germans.<sup>68</sup> Revolutionary innovation occurred late on in the Great War with regard to machine guns when barrage fire was finally adopted. From mid-1917 onwards after the battles of Vimy Ridge and Messines, Haig and his senior commanders embraced this new tactic with the result that all future offensives had an element of barrage fire incorporated into their plans.<sup>69</sup>

#### CULTURAL MODEL OF INNOVATION – HAIG AND HIS SUPPORT FOR MACHINE GUNS

Stephen Rosen’s idea of culture and the concept of senior leadership encouraging innovation can be applied to Field Marshal Sir Douglas Haig and his idea of the machine guns. Haig has been criticised as anti-technology and anti-machine gun but this is not the case. Some writers still attribute the phrase ‘the machine gun is a much-overrated weapon and two per battalion would be more than sufficient’ to Haig, but this attribution has been

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<sup>66</sup> Williamson Murray and Allan R. Millet (eds.), *Military innovation in the inter-war period* (New York, 1998)

<sup>67</sup> *Ibid.* p. 307.

<sup>68</sup> *Ibid.*, p. 308. Another form of innovation that Murray explores is evolutionary innovation. This takes place over a period of time and involves a gradual change in tactics and equipment. Evolutionary innovation focuses on change in an organisation rather than on an individual’s capacity to direct change. Given that this focus in tracing evolutionary innovation is on an organisation rather than on an individual capacity to direct change, and in view of the concentration on four officers at the heart of the present study, this dimension is afforded limited attention here.

<sup>69</sup> J.H. Boraston (ed.), *Sir Douglas Haig despatch of 25 December 1917*, p. 140.

proved to be false by Gary Sheffield amongst others.<sup>70</sup> In fact, Haig from an early stage of his career realised the value of machine guns. Before embarking to the Sudan in 1898, Haig visited the Royal Ordnance Factory to learn about the mechanism of machine guns and he mentioned an action he was involved in against the Dervish, where he believed machine guns would have played a useful role.<sup>71</sup> Haig stated at a General Staff Conference in 1909 that ‘I have taken a good deal of interest in machine guns, and it struck me that on the ordinary range there is no training for war.’<sup>72</sup> So, from an early stage he showed an interest in the deployment of technology to wage war, especially machine guns and he continued this interest when the war broke out.

The above phrase originated as an invention by C.D. Baker-Carr. Writing in his memoirs, Baker-Carr explained that he had sought an increase in the number of machine guns from two to four per battalion. This request was sent via G.H.Q. to all senior commanders for their input. Baker-Carr stated that after weeks of waiting, he eventually received replies from corps and army commanders. Disappointed that no one supported his views, he noted how ‘that one army commander gave his opinion that “the machine gun was a much over-rated weapon and two per battalion were more than sufficient.”’<sup>73</sup> Haig was identified as the ‘army commander’ by Basil Liddell Hart writing in 1930.<sup>74</sup> In 1934 this claim was challenged by a journalist (R.M.) in a copy of *The Field* when (R.M.) wrote that it would be unwise to repeat this quote until Liddell Hart revealed the source of his information.<sup>75</sup> This article made Liddell Hart reveal that while C.D. Baker-Carr had written ‘one army commander’ in his book, on querying it with him Baker-Carr stated that Haig was the army commander in question. This led Liddell Hart to exclaim that ‘Haig was responsible for this astoundingly unrealistic declaration.’<sup>76</sup> Liddell Hart repeated this claim in 1963 in correspondence to Alistair Horne and explained the

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<sup>70</sup> Sheffield, *The Chief: Douglas Haig & the British Army*, p. 151 & p. 427 A.J.P. Taylor used the quote in his book *The First World War: an illustrated history* published in 1963. Sheffield maintains that Baker-Carr was a hostile witness towards Haig due to Haig’s dismissal of Baker-Carr’s proposal to reorganise machine guns in April 1915, which according to Sheffield prompted Baker-Carr’s belated revenge on Haig and his reputation.

<sup>71</sup> Sheffield, *The Chief: Douglas Haig & the British Army*, p. 31.

<sup>72</sup> Report of a conference of General Staff officers at the Staff College, 18<sup>th</sup> to 21<sup>th</sup> Jan. 1909 (Joint Services Command and Staff College, General Officer Staff Conferences, Jan., 1909, p. 68).

<sup>73</sup> Baker-Carr, *From chauffeur to brigadier*, pp 78-9.

<sup>74</sup> Basil Liddell Hart, *A history of the First World War* (London, 1930), p. 172. The book was originally published as *The real war, 1914-1918* in 1930 and re-issued as *A history of the First World War* in 1970.

<sup>75</sup> *Field*, 24 Feb. 1934. ‘Lord Haig and machine-guns’, newspaper cutting of letter to editor of the *Field* by Liddell Hart.

<sup>76</sup> *Ibid.*, 10 Mar. 1934.

circumstances of the revelation. Sir James Edmonds wrote to Liddell Hart in February 1930 recommending C.D. Baker-Carr's book *From chauffeur to brigadier* to him as 'an account of the struggle of a specialist with the General Staff.'<sup>77</sup> Liddell Hart asked Baker-Carr to name the army commander mentioned in the passage. He was told that it was Haig and that the information was taken from a minute in his files. Liddell Hart then confirmed this with Edmonds.<sup>78</sup> However, the notes in Bovington Tank Museum reveal a completely different picture of what transpired. Haig did write to G.H.Q. in April 1915 and said

I am not in favour of the formation of Brigade Machine Gun Companies unless more than four machine guns per battalion become available. Our machine gun detachments have done, and are doing, excellent work, and experience has shown that at least four machine guns are required with each battalion. I am strongly opposed to withdrawing any of the present machine guns or personnel or of training more personnel out here, and I consider that Machine Gun Companies would be useful, but the personnel should be found and trained at home and the companies sent out here as complete units.<sup>79</sup>

This is far from saying that he was not in favour of machine guns. Smith-Dorrien also replied to G.H.Q. and said 'as the campaign goes on, the importance of machine guns becomes more and more marked, and we cannot have too many of them'.<sup>80</sup> However, there was one negative comment from Colonel Frederick M. Maurice, who was an aide to Major General William Robertson and head of the operations section at G.H.Q. He said he doubted if the amount of training possible in the middle of a war made the establishment of machine gun companies worthwhile. As regards tactics, he said that as machine guns were very rarely employed in numbers together, he did not think that there was much tactical gain in the change to machine gun companies.<sup>81</sup> Baker-Carr in his

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<sup>77</sup> Extract from a letter to Alistair Horne, journalist and historian, on F.M. Douglas Haig, 1st Earl Haig and machine, 3 May 1963 (K.C.L., Liddell Hart Centre for Military Archives, Liddell Hart Papers, 11/1963/5).

<sup>78</sup> Ibid.

<sup>79</sup> Opinions on proposed Brigade M.G. Coys., from 1<sup>st</sup> Army, 2<sup>nd</sup> Army, etc., 1915 (B.T.M., Lindsay Papers A16).

<sup>80</sup> Opinions on proposed Brigade M.G. Coys., from 1<sup>st</sup> Army, 2<sup>nd</sup> Army, etc., 1915 (B.T.M., Lindsay Papers A16).

<sup>81</sup> Ibid. Baker-Carr describes Colonel Maurice in a rather derogatory manner as a someone 'who has since achieved considerable fame as a fearless and outspoken military writer' Baker-Carr, *From chauffeur to brigadier*, p. 79. Maurice, who was dismissed from his post as Director of Military Operations in 1918 for criticizing the Prime Minister, David Lloyd George, became military correspondent, initially for the *Daily Chronicle*, and later for the *Daily News*.

memoirs described this episode but did not name Colonel Maurice, however, he is named in the Lindsay Archive in the Bovington Tank Museum.<sup>82</sup>

In fact, there are many instances of Haig supporting the development of machine guns. For example, he wrote to the War Office in March 1916 backing the proposal to create a fourth machine gun company as part of the establishment of the Machine Gun Corps.<sup>83</sup> In December 1916 he expanded on his views on machine guns. As part of his official despatches to the government he wrote

Machine guns play a great part almost a decisive part under some conditions in modern war, and our Machine Gun Corps has attained to considerable proficiency in their use, handling them with great boldness and skill. The highest value of these weapons is displayed on the defensive rather than in the offensive, and we were attacking. Nevertheless, in attack also machine guns can exercise very great influence in the hands of men with a quick eye for opportunity and capable of a bold initiative. The Machine Gun Corps, though comparatively recently formed, has done very valuable work and will increase in importance.<sup>84</sup>

After the Battle of Messines, Haig on a visit to the New Zealand machine gunners mentioned that he had carefully noted the reports on the work of the machine guns in that operation, he considered it worthy of ‘text book repetition’ and expressed the belief that machine gun development was only in its infancy.<sup>85</sup> Based on experience at the Battles of Vimy Ridge and Messines, Haig instigated a series of machine gun barrage demonstrations on the beaches at the Small Arms School at Camiers where he gathered all his senior commanders to observe them.<sup>86</sup> From then onwards the use of machine gun barrages became mainstreamed throughout the British Army. When discussing the activities of 1917, in his official despatches he made a special mention of machine guns

During the past year the use of the machine gun in offensive warfare has been considerably extended. The machine gun barrage has taken a definite place with the artillery barrage in covering the advance of our infantry, while the lighter forms of machine guns have proved of great assistance in the capture of hostile strong points. In these directions, as well as in the repulse of hostile counter-

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<sup>82</sup> Ibid.

<sup>83</sup> Correspondence between Major Baker-Carr, George Lindsay and others, 3 March 1916 (B.T.M., Lindsay Papers E.2004.1823.B.43).34

<sup>84</sup> J.H. Boraston (ed.), Sir Douglas Haig; despatch of 23 December 1916 p. 55.

<sup>85</sup> Luxford, *With the machine gunners in France & Palestine*, p. 82.

<sup>86</sup> Programme of M.G. demonstration at Camiers, & names of personalities attending (snaps attached) (B.T.M., Lindsay Papers E2004.1973.C36).

attacks, great boldness and skill have been shown, and very valuable work has been done by all ranks of the Machine Gun Corps.<sup>87</sup>

In early 1918, when the proposal to form machine gun battalions was put forward by Lindsay, it was quickly endorsed by Haig.<sup>88</sup> Haig continually changed his ideas of machine guns as merely defensive weapons during the war and readily supported the work of Lindsay and his staff at Camiers. He reiterated his ideas in 1918 about the value of machine guns in his despatch to the cabinet when he said

The high reputation earned by the different units of the Machine Gun Corps during the defensive battles of the spring has been well maintained under the changed conditions of the latter part of the year. The great value of the machine gun in the attack, when handled with energy and decision, has been proved again and again. The consistent failure of the enemy's frequent counter-attacks has been due in no small degree to the skilful use of these weapons.<sup>89</sup>

Haig also mentions that he created the post of the Office of the Inspector of Machine Gun Units under the command of Brigadier General Cuthbert T. Lucas and then Brigadier General L Renny and that this had created a new impetus for innovation.<sup>90</sup> This study has presented ample evidence of Haig's active support for deployment of machine guns and his track record throughout the war for providing opportunities for machine gun development. Of course as Commander in Chief, he had to balance one weapon system against the other, but he certainly never discouraged or hampered the use of machine guns. His support was consistently low-key, consequently he has left the impression that he had no interest in machine guns, and his legacy has been misinterpreted. Haig therefore exemplifies Rosen's model for how a senior military leader encouraged innovation through a variety of channels.

## CIVILIAN MILITARY INTERACTIONS

The role of civilian intervention in the process of military innovation as described by Barry Posen is evident in the development of machine gun doctrine. While Posen maintains that it is the interaction of military mavericks and civilians that drives

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<sup>87</sup> J. H. Boraston (ed.), Sir Douglas Haig; despatch of 25 December 1917, p. 140.

<sup>88</sup> Hutchinson, *Machine guns*, p. 263.

<sup>89</sup> J. H. Boraston (ed.), Sir Douglas Haig despatch of 21 December 1918, p. 303.

<sup>90</sup> *Ibid.*, p. 354.

innovation in the military, he does not define what he means by a maverick. However, Stephen Rosen went further and proposed two definitions of a maverick. He wrote ‘if by “maverick” he simply means a military man who favours innovation more than the average officer, innovation will by definition, be supported by mavericks. If, however he is using “maverick” in its dictionary sense, he is referring to isolated and masterless men who have rejected the authority of their nominal military superiors.’<sup>91</sup> Such men have rejected military authority in that they do not believe that their military superiors understand the innovation proposed to them. This frustration drives them to beyond the bounds of military authority and appeal directly to the political class in charge of the military.<sup>92</sup> According to Posen, these officers are the alleged engines of military innovation. Posen examined the inter-war years and concluded that it was the intervention of civilians which forced the RAF to develop Fighter Command and radar-based defence in preference to Bomber Command. At the time, the bomber advocates were in the ascendancy and would not have diverted funding to fighters unless forced to do so.<sup>93</sup> According to Posen, civilians intervene in military affairs out of fear of the high cost of military action. This is what happened in France during the 1930s. The high cost of victory in the First World War forced French statesmen to develop a defensive doctrine for their military forces and this was then readily accepted by the French army.<sup>94</sup>

Civilian intervention in machine gun doctrine occurred on different occasions. The first took place in America, when John Henry Parker wrote directly to Theodore Roosevelt in 1908 trying to influence him in the establishment of a separate machine gun service.<sup>95</sup> Parker had served with Roosevelt during the Spanish-American War and kept up correspondence with him when Roosevelt entered politics. In 1908, Parker was tasked with producing recommendations with regard to machine guns in the US Army. He submitted his report *Manual of machine gun service for machine guns attached to infantry* to the War Department for consideration.<sup>96</sup> Unbeknown to his superiors, he also sent a copy of his proposal directly to Roosevelt, who was then President, thereby bypassing official channels. President Roosevelt was interested in the subject and was

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<sup>91</sup> Rosen, *Winning the next war*, p. 11.

<sup>92</sup> Ibid.

<sup>93</sup> Posen, *The sources of military doctrine*, p. 225.

<sup>94</sup> Ibid., p. 234.

<sup>95</sup> Armstrong, *Bullets & bureaucrats*, p. 161.

<sup>96</sup> Ibid.



going to recommend to Congress that such a service be established and an appropriation be made for its maintenance.<sup>97</sup> However, the War Department had another report opposing Parker's idea from Major William H. Johnston.<sup>98</sup> When informed of the opposition to Parker's ideas from the General Staff Roosevelt suggested that the report be examined for 'manifest errors' and 'that the regulations be submitted to the test of practical use as soon as possible.'<sup>99</sup> He went further and reworked some of Parker's proposal which he presented to the General Staff. After agreement from the General Staff Roosevelt presented a bill to Congress to establish a machine gun company in each regiment with a separate core of officers who would train and operate these companies. Congress rejected the bill and would not increase the number of officers in the army. This caused the proposal to fail due to the lack of officers to staff the new units.<sup>100</sup> Parker almost succeeded in getting the army to accept his ideas, through his friendship with Roosevelt but it also marked him out as somewhat of a troublemaker to his superiors. The term 'maverick' may be applied to Parker in this instance as he exemplified civilian military intervention. Although, Roosevelt's input failed as he did not control Congress, but it demonstrated with appropriate civilian intervention.

Lindsay courted politicians in his drive to further his aims and his paper *The strategical [sic] and tactical value of machine guns* was passed to the Under Secretary of War, Harold Tennant who tried to use it to embarrass the government.<sup>101</sup> Lindsay was cautioned by his commanding officer Brigadier General Hill about his conduct but sometime later David Lloyd George, the Minister of Munitions, presented a paper to the Cabinet addressing very similar ideas to Lindsay's on the strategic value of machine guns.<sup>102</sup> Brutinel was also noted for using his political contacts to promote his aims. At the start of the war, he established 'the Automobile Machine Gun Brigade No 1' with the help of Sir Clifford Sifton and the Minister for Militia and Defence, Sir Sam Hughes. The impact of the establishment of this unit was far reaching and whereas it was supported by these politicians, it was dismissed by Field Marshal Kitchener on its arrival in Britain.<sup>103</sup>

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<sup>97</sup> *New York Tribune*, 27 Oct. 1908.

<sup>98</sup> Armstrong, *Bullets & bureaucrats*, p. 161.

<sup>99</sup> *Ibid.*, p. 163.

<sup>100</sup> *Ibid.*, p. 161.

<sup>101</sup> Letter from General Hill to Major Lindsay and his reply, 19 Nov. 1915 (B.T.M., Lindsay Papers E2004.1775.B6).

<sup>102</sup> Cabinet papers, 12 Nov. 1915 (T.N.A., CAB/24/1).

<sup>103</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 7.

Brutinel was bitterly disappointed with the response and saw it as an example of the High Command's inertia with regard to new weapons and ideas. Not happy to remain in England with the depot troops he complained to Sir Clifford Sifton and asked him to use his political influence to have his troops transferred to France.<sup>104</sup>

These political interactions failed the promotion of machine gun doctrine and in some cases had the opposite effect hardening senior commanders' attitude to the innovators. The closest this civilian intervention came to success was in America with the work of Roosevelt who had an interest in machine guns from his own experiences in Cuba. He realised that the War Department would not seek sanction for a separate machine gun service so he decided to impose it on them using the expertise of Parker. While there was some civilian engagement in the machine gun debate it was neither critical nor successful, yet it does conform to Posen's notion of civilian intervention in military innovation. It also demonstrates the lengths that these officers would go to in order to achieve their ambitions. This is something that Vincent Davies highlights as significant in his theory for a successful innovator.<sup>105</sup>

Rosen points to some officers who have the attributes of a maverick, men like General Billy Mitchell and his ideas for air power in the U.S. and Colonel Charles de Gaulle and his ideas of mobile war in France.<sup>106</sup> All of these officers made use of civilian outsiders when their ideas were blocked, but ultimately failed in their efforts as they only succeeded in arousing the hostility of the military establishment, which became less open to change.<sup>107</sup> In the case of these officers it was the act of attempting to involve civilians which ultimately aroused the opposition to their ideas.

#### STRATEGIC IMPERATIVES FOR MILITARY INNOVATION

Rosen challenges the contention that military innovation is driven by mavericks and instead asserts that it is the ideological struggle within the officer corps that determines attempts at whether or not innovation succeeds. According to Rosen, control over promotion of officers is the source of power within the military.<sup>108</sup> Therefore, senior

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<sup>104</sup> Tremblay, 'Brutinel: a unique kind of leadership', p. 63.

<sup>105</sup> Armstrong, *Bullets & bureaucrats*, p. 114.

<sup>106</sup> Stephen Peter Rosen, 'New ways of war: understanding military innovation' in *International Security*, xiii, no. 1 (Summer 1988), p. 139. Liddell Hart went to Leslie Hore-Belisha, de Gaulle went to Paul Reynaud and Mitchell went directly to the US public.

<sup>107</sup> Ibid.

<sup>108</sup> Rosen, *Winning the next war*, p. 6.

officers have control the level of innovation by only promoting those officers who agree with them. Even in Western countries where there is civilian control over the military and civilians can have a role in military innovation, this takes the form of lending support for the decisions of their military leadership.<sup>109</sup>

Stephen Rosen argues that armies are not forever doomed to ‘fight the last war.’ Rather, they are able to respond to changes that they face by innovating. In his studies, he identifies the distinct roles of the civilian innovator and the military bureaucrat. According to Rosen, innovation occurs at a different pace during peacetime, when it can develop at a sustained pace, hence building new military capabilities. By contrast, in wartime innovation is constrained by the fog of war and the urgency of combat needs. He bases his analysis on twenty-one case studies, varying from the role of the tank in the British Army during the First World War to carrier aviation in the U.S.<sup>110</sup>

Discussing the development of the tank in the British Army during the First World War, Rosen sees its introduction as an innovation that worked not only because of its tactical capabilities but also because it had a strategic focus.<sup>111</sup> The tank was developed by the British at a lower operational level and came about according to Rosen as a result of organisational learning on the part of senior commanders in the field.<sup>112</sup> Both Generals French and Haig supported the development of the new technology; indeed Haig asked that as many as possible be produced by May 1916 without prejudice to other war production.<sup>113</sup> When the tanks were being produced in small numbers, the incremental cost of production was small and did not generate any criticism. But when production increased in 1917, questions were raised as to the manpower requirement of the Tank Corps. As the battles of late 1917 took their toll and a manpower problem started to manifest itself, there ensued a scramble between the competing forces: and the manpower requirement for the Tank Corps became part of that. It was after the Battle of Cambrai in November 1917, that the commander of the Tank Corps, Brigadier H.J. Elles, was able to prove that tanks (properly supported) could use manpower in a more efficient manner.<sup>114</sup> Rosen also highlights the British Army struggled to learn how to use the tank tactically

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<sup>109</sup> Ibid.

<sup>110</sup> Ibid.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

<sup>113</sup> Ibid., p. 122.

<sup>114</sup> Ibid.

and it was only towards the end of the war in a plan code-named 'Plan 1919' that they finally had the resources to use them decisively. However, the war ended before this could be put into action.<sup>115</sup> Rosen advocates such measurement of strategic effectiveness when trying to assess the allocation of scarce resources and evaluate innovation.<sup>116</sup> Rosen notes that while the introduction of the tank was not inhibited by senior commanders, that their successful implementation was hampered by the slow pace of organisational learning. He contends that 'This slowness, in turn, was related to the problems of defining a strategic measure of effectiveness, of utilizing available information to evaluate the innovation, and the absence of tight central controls to ensure the implementation.'<sup>117</sup> Focussing on the very real challenge of conserving manpower allowed senior commanders to more readily make the decision to support the largescale use of tanks.

Rosen's analysis of the deployment of the tank can be directly applied to the story of the Machine Gun Corps. Lindsay in November 1915 proposed that machine guns could reduce the number of soldiers required to man defensive positions on the Western Front.<sup>118</sup> David Lloyd George Minister of Munitions, presented a paper based on Lindsay's ideas to the Cabinet on the strategic value of machine guns.<sup>119</sup> Raymond Brutinel was called upon in early 1918 to express an opinion on the proposal to reduce the number of machine gunners in order to fill shortfalls in the infantry battalions. He attended a conference of senior commanders at which he was instructed to support the view of H.Q. in effecting this change. He refused saying that reducing the number of machine gunners would not remedy the shortage of men in the infantry battalions and would have the effect of reducing the fire power available to infantry commanders.<sup>120</sup> In fact, he succeeded in persuading the British Army to increase the number of machine gun units. He claimed that eight additional machine gun units were established for distribution to various British Armies.<sup>121</sup> The balancing of manpower resources across the different services caused problems throughout the war, and advocates of machine guns pointed out that some of these could be eased by the correct use of machine guns. Lindsay described

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<sup>115</sup> Ibid.

<sup>116</sup> Rosen, *Winning the next war*, p. 125.

<sup>117</sup> Ibid., p. 128.

<sup>118</sup> Paper on the Strategical & Tactical value of M.Gs, 9 Nov. 1915 (B.T.M., Lindsay Papers B1).

<sup>119</sup> Cabinet papers, 12 Nov. 1915 (T.N.A., Committee of Imperial Defence, CAB/24/1).

<sup>120</sup> Memo with reference to machine guns, War diary, Canadian Machine Gun Officer Canadian Corps, 25 Apr. 1918 (L.A.C. Canadian Great War Project, Appendix 28)p. 5.

<sup>121</sup> War diary, Machine Gun Officer Canadian Corps, Apr. 1918 (Canadian Great War Project, Appendix 28).

machine guns as ‘economisers of men’, Applin described them as ‘life savers’ and Brutinel developed the use of machine guns as a defence in depth scheme. However, they might be classified, it was recognised that machine guns had the advantage of reducing manpower requirements with no reduction in defence effectiveness. But it was only in the last stages of the war that these innovative officers were listened to.

#### BOTTOM-UP INNOVATION

Adam Grissom in his article ‘The future of military innovation studies’ has highlighted how all the major theories of military innovation assume that innovation operates as a top-down process with the result that there has been no investigation of bottom-up innovation. In support of his argument in favour of this approach, Grissom identifies the conversion of the German 88mm flak anti-aircraft gun into an anti-tank gun during the Spanish Civil War as a bottom-up innovation.<sup>122</sup> Creating a new use for a weapon system and doubling its capacity made it unique. One can equally argue that the development of the offensive use of machine guns, using a weapon originally designed as a purely defensive munition represents bottom-up innovation. At the start of the war, the defensive capabilities of machine guns were well understood, but only after officers like Lindsay, Brutinel and Applin developed the offensive use of machine guns did they reach their fullest potential. This conversion of the machine gun into an offensive weapon was conducted by relatively junior officers which is a hallmark of bottom-up innovation. When in 1917 that Haig mentioned to a group of New Zealand machine gunners after the Battle of Messines that machine gun development was only in its infancy, he was referring to this innovative offensive use of machine guns which doubled the impact of the weapon.<sup>123</sup>

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<sup>122</sup> Grissom, ‘The future of military innovation studies’, p. 917.

<sup>123</sup> Luxford, *With the machine gunners in France & Palestine*, p. 82.

## GATEKEEPERS AS INNOVATION INHIBITOR- PERSHING AND MACHINE GUNS

Two authors, Adam M. Jungdahl and Julia M. Macdonald, have used the concept of gatekeepers when analysing inhibitors of military innovation. They argue that the hierarchical structure of military organisations allows certain individuals to develop expertise and opinions to such an extent that they can hold back innovations.<sup>124</sup> This argument was developed through two case studies, the first about the delayed purchase of repeating rifles for the Union Army during the American Civil War and the second focussed on the lack of a heavy tank for the US Army during World War Two.<sup>125</sup> The findings arising from these case studies can be applied to our analysis of Parker and his battles with the War Department. In the context of machine gun innovation in the US Army the inhibitor was General Pershing.

The American government had decided to fight the war with Germany as a separate and distinct force, despite pressure from the British and French. One of the first tasks for Pershing was to create a proper structure to conduct the campaign. As part of this reorganisation, the creation of a new divisional structure for the US Army was required. Two exercises were undertaken separately and these collectively became known as the *General Organization Project*.<sup>126</sup> Colonel Chauncey Baker was tasked by the Secretary of War, Newton D. Baker with studying the structure of the Allied armies and adopting best practice into a new American Army. His study became known as the 'Baker Mission'.<sup>127</sup> When developing a new structure Pershing involved John Henry Parker in the planning process.<sup>128</sup> While the headquarters of the AEF was still in London, Baker arrived with his Mission. It was decided that a conference was required so that 'each body should obtain the benefit of the conclusions reached by the other and that, if possible, a policy to be recommended to the proper authorities might be formulated.'<sup>129</sup> After further field visits in France by the respective officers to the Allied armies, a conference was held in Paris in July 1917 to pool the collected information.

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<sup>124</sup> Jungdahl & Macdonald, 'Innovation inhibitors in war', pp 467.

<sup>125</sup> Ibid. pp 467-79.

<sup>126</sup> Centre of Military History, *United States Army in the World War, 1917-1919: organization of the American Expeditionary Forces* (Washington, 1988), p. 107 (hereafter *United States Army in the World War*).

<sup>127</sup> Ibid.

<sup>128</sup> Ibid.

<sup>129</sup> Ibid.

This meeting was recorded as the *Conference on Organisation and Equipment* and was attended by thirty-one officers including Colonel John Henry Parker as the army machine gun expert. It met over three days and Pershing personally presided. It drew expertise from infantry, cavalry, artillery and engineering officers.<sup>130</sup> The purpose of the conference was to address the question of infantry organisation and its required equipment needs. Some of the key points made with regard to machine guns were:

- 1) (a) Strength of infantry company (250 men)
- 2) (b) Composition of infantry battalion, four infantry companies and one infantry machine gun company.
- 3) (c) Adoption of the automatic rifle as an infantry weapon to be issued at the rate of 16 per infantry company
- 4) (e) Adoption of cart transportation for infantry machine gun companies instead of packs.
- 5) (g) Adoption of 16 machine guns to a company; 12 for equipment and 4 for spare.
- 6) (h) Adoption of following official description of automatic rifles and machine guns. Automatic rifles: rifles using automatic fire with infantry ammunition, recoil sustained by the body of the soldier. Machine guns: rifles using automatic fire with infantry ammunition but with recoil sustained by some sort of solid mount and capable of being clamped.
- 7) (l) The adoption of a divisional reserve of machine guns consisting of two normal companies and one tank company.<sup>131</sup>

While there was a major difference of opinion between the officers of the ‘Baker Mission’ and the officers from G.H.Q. about the artillery component of the division, but there was total agreement on the machine gun element. The *General Organization Project* thus authorised a total of twelve machine gun companies for each division, plus three companies as reserve.<sup>132</sup>

The *General Organization Project* established the size of an American division at 27,120 troops. It was based around the concept of two infantry brigades of two regiments each of 3,700 men.<sup>133</sup> This structure became known as the ‘square division’ and was over twice the size of its equivalent British or French unit. Various theories have been put forward for this size of organisation, from the scarcity of regular officers to command the enlarged army to the idea that this large organisation fitted into the A.E.F.’s tactical plan.

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<sup>130</sup> *United States Army in the World War* p. 109.

<sup>131</sup> *Ibid.*

<sup>132</sup> *Ibid.*

<sup>133</sup> *Ibid.*

According to Mark Ethan Grotelueschen it was James G. Harbord, Pershing's first chief of staff in France, who described this large division as necessary to carry out the offensive doctrine of the US Army.<sup>134</sup> The idea was to breach the enemy line with a major infantry assault and follow up by destroying the enemy in the open. The large division could suffer more casualties and hence remain in the field for longer periods without relief.<sup>135</sup>

However, while the senior officers of the A.E.F. accepted some advice from the Allied commanders, they were determined to fight the war on their own terms and with their own doctrine. Pershing set out his thoughts on how this could be achieved and what training was necessary. In August 1917 in a document entitled 'The general principles governing the training of units of the American Expeditionary Forces', he emphasised that the rifle and bayonet were the principal weapons of the infantry.<sup>136</sup> He wrote that the American infantryman 'will be trained to a high degree of skill as a marksman both on the target range and in field firing. An aggressive spirit must be developed until the soldier feels himself, as a bayonet fighter, invincible in battle.'<sup>137</sup> However, this idea of the soldier armed with a rifle and bayonet dominating the field of battle was at odds with the experience of the Western Front. Concentrated firepower was what mattered at this stage of the war and it was a cause of some concern to people like John Henry Parker who tried to bring this to the attention of Pershing. In a report to Pershing about a visit he made to a French automatic weapons training facility with another officer, dated 7 August 1917, Parker wrote:

We are both convinced we have been shown... the day of the rifleman is done. He was a good horse while he lasted, but his day is over... The rifleman is passing out and the bayonet is fast becoming as obsolete as the crossbow.<sup>138</sup>

It is not recorded what Pershing made of the comments at the time but James W. Rainey came across a handwritten comment by Lieutenant Colonel Paul B. Malone, chief of the AEF Training Section, which reads 'speak for yourself, John,' in the US National

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<sup>134</sup> Mark Ethan Grotelueschen, *The AEF way of war: the American Army and combat in World War I* (New York, 2007), p. 28 (hereafter Grotelueschen, *The AEF way of war*).

<sup>135</sup> Grotelueschen, *The AEF way of war* p. 28.

<sup>136</sup> *United States Army in the World War, 1917-1919, general orders, GHQ, AEF* (vol. 12-15, Washington, 1988), xiv, p. 305.

<sup>137</sup> *Ibid.*

<sup>138</sup> James W. Rainey, 'Ambivalent warfare: the tactical doctrine of the AEF in World War I' in *Journal of the US Army War College*, xiii, no. 3 (September 1983), p. 38 (hereafter Rainey, 'Ambivalent warfare'). The US National Archive reference is Record Group 120, entry 268, file 13.1.



Archives.<sup>139</sup> Parker was looking to supplant the rifleman as the main weapon system with artillery and machine guns. On entering the war, a cursory examination of the conflict would have revealed that the two main killers on the modern battlefield were artillery and machine guns. Yet, this fact seems to have escaped most American senior commanders during the war. They seemed to regard Allied leaders with condescension and rejected their advice. This was also the experience of R.V.K. Applin when he returned from his training stint in America.<sup>140</sup> One of the problems that Parker and other like-minded officers faced was Pershing's fixation with the concept of the American soldier, armed with the rifle as the supreme fighter on the battlefield. Pershing noted how new weapons like the machine gun could change warfare

It is true that the tactics of the battlefield change with improvement in weapons. Machine guns, quick-firing, small-bore guns and rapid fire artillery make the use of cover more necessary. They must be considered as aids to the infantryman, expert in the use of the rifle and familiar with the employment of hasty entrenchments. It is he who constitutes our main reliance in battle.<sup>141</sup>

Pershing goes on to lay the blame for the state of machine gun development on the War Department:

... the machine gun, as an infantry weapon, had been carried to a high degree of perfection, especially in the German Army... In this as in every other line of preparation, we were far behind all others. The question of adopting new types of machine guns and automatic rifles for our army had been discussed... for years... and test after test had been made, but the nearest approach to a decision was an acrimonious discussion in and out of the press between the Ordnance Department and certain inventors... When we entered the war, no conclusion regarding the best make of gun had been reached that, in the opinion of the War Department would warrant its manufacture in quantity. Not only were we without sufficient machine guns, but our organization tables did not anticipate their use in anything like the numbers employed by the enemy.<sup>142</sup>

While lamenting the sorry state of machine guns in the AEF, and despite allocating a massive amount of machine guns to each infantry division through the *General Organizational Project* Pershing virtually ignored the weapon for the rest of the war. Nonetheless, the training that the AEF soldiers received under the supervision of the

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<sup>139</sup>Ibid., p. 45.

<sup>140</sup> See section on Applin's visit to the US.

<sup>141</sup> Virgil Ney, *Organisation and equipment of the infantry rifle squad: from valley forge to road* (Fort Belvoir, Virginia, 1965), p. 32 (hereafter Ney, *Organisation & equipment*).

<sup>142</sup> Ibid., p. 33.

Allies did draw upon their experiences and involved the use of modern weapons like the machine gun.

As Pershing was forming his new army to send to Europe, he became fixated with the notion of fighting in a different way to that of his European allies. He blamed the psychology of the protagonists for the stalemate of the Western front. He wrote after the war

In the situation that followed the first battle of the Marne, the great armies on the Western Front were entrenched against each other and neither had been able to make more than local gains. The long period during which this condition had prevailed, with its resultant psychological effect, together with the natural leaning of the French toward the defensive ... had apparently combined to obscure the principles of open warfare.<sup>143</sup>

Pershing did not believe in firepower as practised by the French and British. He thought that this reliance on firepower to achieve battlefield success caused them to lose their offensive spirit: he would restore this spirit through the use of his rifle equipped citizen army. He seems to have missed the point that the French had suffered hugely at the hands of the spirit of the offensive in 1914 and had still not recovered.

Pershing's vision of 'open warfare' was at odds with what was practised by the Allies and Germans. They understood that after four years of war, the infantry could not survive on the modern battlefield without ancillary weapons. They all practised some form of 'open warfare' and the Germans demonstrated a version of it in the Kaiserschlacht in spring 1918.<sup>144</sup> The Canadians practised it during the summer of 1918 and used it successfully during the 100 Days Offensive.<sup>145</sup> The major problem with the American version was that once a breakout was achieved, the infantryman was unsupported by heavy weapons and was basically on his own. This was in stark contrast to the Canadian's version where Brutinel realised that the infantry needed to be supported with mobile weapon systems. Pershing's embracing this 'open warfare' model meant that the training provided placed less emphasis on trench warfare. Pershing was under pressure from his allies to use American soldiers

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<sup>143</sup> Andrew Weist, 'Preferring to learn from experience: the American Expeditionary Force in 1917' in Peter Dennis and Jeffery Grey (eds.), *1917 Tactics, training and technology* (Australia, 2007), p. 18 (hereafter Weist, 'Preferring to learn from experience').

<sup>144</sup> Zabecki, 'Operational art and the German 1918 offensives'

<sup>145</sup> See section on Brutinel during the 100 Days offensive.

as replacements for their own manpower losses hence he had a reason to want to be distinctive and some commentators had alluded to this as a reason for his rejection of Allied doctrine.<sup>146</sup>

Pershing believed in the moral fibre of the American infantryman as the winner of battles and because of his belief which was shared by his senior officers he ignored the value of machine guns as articulated by Parker. Thus, while machine guns were imbedded into the battle plans of the other allied armies by the time of the American entry into the war, the Americans ignored all of the advice that was offered. This is a classic instance of Pershing acting as an inhibitor intent on slowing the development of machine guns in the U.S. Army. Pershing's position of authority allowed him to effectively block any weapon system that he did not consider necessary. This decision was confirmed by his senior officer team, one of whom Lieutenant Colonel Paul B. Malone, chief of the A.E.F. Training Section, dismissed Parker's ideas about the value of firepower on the battlefield.<sup>147</sup>

According to Jungdahl and Macdonald, there are alternative explanations for the delayed introduction of innovative new weapons. The first is the risk of experimenting with new weapons during combat and the second is the production logistics of new weapons. There is also the problem of information overload during wartime when senior commanders do not have the time to adequately consider every new innovation.<sup>148</sup> However, on the other hand the value of machine guns was well understood at this stage of the war and should not have been so readily discounted in the A.E.F. When innovation does occur, it can often be attributed to mavericks working to the limit of military convention. What can be lost in the innovation debate is the appreciation of the role that 'gatekeepers' may play in inhibiting successful innovation.

#### INTRASERVICE MODEL RIVALRY WITHIN THE CANADIAN CORPS

Rosen discusses the intra-service model of military innovation in his book *Winning the next war: innovation and the modern military*. This model assumes that the struggle for

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<sup>146</sup> Grotelueschen, *The AEF way of war*, p. 43.

<sup>147</sup> Rainey, 'Ambivalent warfare', p. 45.

<sup>148</sup> Jungdahl & Macdonald, 'Innovation inhibitors in war', p. 477.

scarce resources within a particular service will drive competition and innovation.<sup>149</sup> An example of this was the competition between Brutinel and Brigadier General Andrew McNaughton in the C.E.F. over Brutinel's machine gun tactics. McNaughton considered artillery to be superior to machine guns and regarded use of machine guns as light artillery as a waste of resources. He articulated these thoughts in the radio series 'Flanders Fields' in 1964 which were subsequently published in his biography by John Swettenham in 1968. Swettenham noted that 'Brutinel's obsession with using machine guns to fire barrages found little favour with McNaughton.'<sup>150</sup> According to McNaughton

I was all for employing machine guns to fire indirectly on the appropriate occasion [when the ground was right] but the trouble was, once you had this art of indirect fire, or at least once you thought you had it, the tendency was to use it when it wasn't apt. The machine gun, you must never forget, is a weapon of opportunity. If it gets one burst in against a few Germans coming up in file, or something of that sort, it's paid for itself. But you can fire thousands of rounds in indirect fire and the Germans wouldn't even know they'd been fired at because they're usually scattered over too wide an area and the bullets merely prick the air. The expectation of a kill is low and, unlike a shell, the danger space is very short.<sup>151</sup>

This outburst had come about during the 100 Days Offensive when the Canadians were attacking the Drocourt-Quéant line in September 1918. Brutinel in command of his Independent Force was to use his armoured cars to dash forward and attempt to seize a bridge over the Canal du Nord at Marquion.<sup>152</sup> This attack failed as the road was blocked by fallen trees. McNaughton was in charge of the Canadian heavy artillery and was to lay a barrage a thousand yards in front of the Independent Force.<sup>153</sup> This zone was where most of the German artillery was emplaced. Due to the confused nature of the fighting, Brutinel mistakenly thought that one of his cars had made it to the bridge.<sup>154</sup> Because of this report the artillery fire was suspended, leaving the infantry exposed to German counter battery fire. McNaughton was furious and apparently remonstrated with H.Q. but his demand to reinstate the artillery barrage was denied for over six hours.<sup>155</sup> McNaughton blamed Brutinel for this suspension of the

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<sup>149</sup> Rosen, *Winning the next war innovation and the modern military*

<sup>150</sup> John Swettenham, *McNaughton volume I, 1887-1939* (Toronto, 1968), 152 (hereafter Swettenham, *McNaughton volume I, 1887-1939*).

<sup>151</sup> *Ibid.*, p. 152-3.

<sup>152</sup> War diary, Machine Gun Officer Canadian Corps, Oct. 1918 (L.A.C. Canadian Great War Project, Appendix xiii).

<sup>153</sup> *Ibid.*

<sup>154</sup> *Ibid.*

<sup>155</sup> Swettenham, *McNaughton volume I, 1887-1939*, p 152-3

artillery which, he believed, led to unnecessary infantry casualties even though he had artillery intelligence that the road was blocked prior to the attack. He said of the artillery barrage 'carefully prepared and well within our powers of execution, was sacrificed to a plan fantastic in conception and, from the start, improbable of success.'<sup>156</sup> Swettenham quotes from the Canadian official history in support of McNaughton's view about Brutinel's force when he wrote 'Unfortunately claims to success came back without foundation. Because of this, the artillery was not able to re-establish its neutralizing fire over a belt about 1000 yards wide astride the Arras-Cambrai road which it had been ordered to suspend for the Independent Force's advance. A serious consequence was the heavy unopposed German fire that met the Canadians attacking down the forward slopes from Dury'.<sup>157</sup> However, Swettenham's omission to explain that the source for the official history was McNaughton himself casts doubts on the impartiality of this evidence.

McNaughton also thought that Brutinel was taking credit for the victory at the Battle of Valenciennes at the expense of the artillery led by McNaughton himself.<sup>158</sup> The assault on the city of Valenciennes was planned for the 1 November 1918 and McNaughton was given free rein to plan and execute the artillery assault. He assembled one of the greatest concentration of artillery of the war including 104 heavy pieces. Over 2,149 tons of ammunition was used in a two-day period, and the battle was a complete success for the Canadians. Over 800 Germans were killed and 1,379 were captured for the loss of 60 dead and 360 wounded Canadians.<sup>159</sup> As part of the battle 104 machine guns were used, including seventy-six for a machine gun barrage. McNaughton was concerned that the use of so much ammunition would be enquired into, so he recorded the amount of German dead, and noted how the bombardment had left the battlefield in a shambles with scarcely a square yard of ground untouched.<sup>160</sup> There was no enquiry, but after the battle, according to McNaughton, Brutinel attributed the large number of German casualties to the machine gun barrage. McNaughton, however had a different perspective:

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<sup>156</sup> Ibid., 151.

<sup>157</sup> Ibid., 151. See also Nicholson, *Official history of the Canadian Army*, pp 438, 586. The quote used in the official history were made by General A.G.L. McNaughton on 21 Aug. 1961 to G.W.L. Nicholson.

<sup>158</sup> A.G.L. McNaughton, 'The capture of Valenciennes, a study in co-ordination' in *Canadian Defence Quarterly*, x, no. 3 (Apr. 1933), p. 293 (hereafter McNaughton, 'The capture of Valenciennes').

<sup>159</sup> McNaughton, 'The capture of Valenciennes, a study in co-ordination' p. 293

<sup>160</sup> Ibid., p. 294.

In the communiqué that came out my good friend Brutinel started claiming that all this was due to his long range machine gun barrage. He claimed it just a little too soon and we couldn't allow it. We didn't want to overtake him for reasons of personal glorification or anything of that sort. But had this thing been attributed to machine guns, and it was wrong, we were in for disaster in the battles that might lie ahead of us. You have to get a realistic approach.... I told our intelligence officer to ask every prisoner of war whether, in marching up to counter-attack, he had come under machine-gun fire. We couldn't get a German prisoner from any of the counter-attacking battalions to say that he even knew he was being fired at.<sup>161</sup>

Notwithstanding his claims there was evidence from German prisoners about the effect of machine gun barrages during this period. After the Battle of Vimy Ridge, Brutinel collected testimonies from German prisoners about the effect of barrage fire. The report noted the reduced ability of the Germans to conduct a defence over a period of time.<sup>162</sup> During the Battle of Passchendaele, a machine gun intelligence report referenced the effect of the machine gun barrage fired. It collated statements from captured German prisoners during the latter stages of the battle and recorded

1. Machine gun fire was not noticeable on the previous night, however during the attack it appeared very heavy and did a great deal of damage causing heavy losses and casualties among the reserves, who trying to come up were literally mowed down by our machine gun fire.
2. Munitions' columns did not get through. Owing to this fact the M.G. Coys of the 38<sup>th</sup> Fusilier and the 1<sup>st</sup> M.G.Coy. of the 10<sup>th</sup> Grenadier Regt., had only 2500 rounds of ammunition per gun when our attack began.
3. The machine guns of these two companies were in covered shell holes from which they could not fire, having no facilities for mounting their guns. Owing to our artillery and M.G. fire the men did not venture out of the shell hole, hence, the guns of those two companies were taken without them having fired a shot.

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<sup>161</sup> Swettenham, *McNaughton volume 1, 1887-1939*, 166.

<sup>162</sup> 'Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 19. Lieutenant General Arthur Currie, G.O.C Canadian Corps to Lieutenant Colonel Raymond Brutinel, 10 November 1917 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Currie noted the work of the machine gunners during the Battle of Passchendaele and wrote to Brutinel to convey his thanks. He also mentioned that 'all prisoners have testified to the great losses caused to the enemy by our machine gun fire, while our own infantry are loud in their praises as to the support rendered by our machine gunners.' Lessons learnt [sic] from Messines – Wytschaete operations – machine guns, 1917 (T.N.A., W.O., 158/298) and War diary, 4th Machine Gun Company A.I.F., June 1917 (Australian War Memorial, AWM4, 24/9/12). After action reports collected by 4<sup>th</sup> Machine Gun Company, A.I.F. and the X Corps from the Battle of Messines record German prisoners comments about the effect of machine guns on their ability to fight.

4. Casualties due to M.G. fire were very great in the 2<sup>nd</sup> German line where German reinforcements were trying to come to the assistance of their front line troops.<sup>163</sup>

Another soldier, A. Bole confirmed this evidence during the assault on the Canal du Nord when a ninety-six gun barrage was fired. He confirmed that the German prisoners said that the machine gun barrage was just like rain.<sup>164</sup> Brutinel made the comment about the Battle of Valenciennes and the use of machine guns and artillery 'McNaughton's artillery fire by daylight had destroyed the German defensive positions. The Germans were, prevented from repairing their defences at night because of the indirect night machine gun fire. This was one of the factors, which contributed to the success of the battle. Had our artillery continued to fire at night, they would have been spotted by German counter-batteries.'<sup>165</sup> While there is ample evidence of the effect of machine gun barrage fired during the war, the point that McNaughton makes is valid. An artillery shell is much more destructive than a machine gun bullet and indeed the French utilised quick firing 75's with shrapnel which had the same effect as machine guns. The potential point that he misses is that moving artillery around the battlefield during the period was difficult, and once an attack began, the infantry (if successful) can move out of range of the protective artillery. Machine guns on the other hand can be moved more easily and they can stay in touch with the infantry on the battlefield.

Both Brutinel and McNaughton are correct in their own way. Both give evidence of German prisoners endorsing the destructive capabilities of machine guns and artillery and this evidence are valid. However, both weapon systems had their place on the battlefield. Brutinel had developed machine guns as light artillery (and even lectured on it) and in that role it proved successful on the Western Front. At the Battle of Valenciennes, artillery under McNaughton reached its zenith and would continue to dominate future battlefields, whereas the use of machine guns would change. McNaughton was critical of Brutinel's Brigade at the Battle of Drocourt-Quéant; yet this form of armoured force would develop very significantly during the inter-war years. It is

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<sup>163</sup> M.G. Intelligence Report 11, Aug. 1917-31 Dec. 1917 (L.A.C., I-88631).

<sup>164</sup> Canadian Broadcasting Corporation, Digital Archives Flanders Fields radio programme, Canadian Broadcasting Corporation Digital Archives, 1964 transcript, 15/3.

<sup>165</sup> Larry Worthington to Raymond Brutinel, 8 April 1964, (L.A.C. Worthington Correspondence, R13880 O-X-E, 45, 10).

not clear whether McNaughton was aware that General Horne, commander of the First Army, ordered Brutinel to co-operate with Lindsay's Brigade, a similar type of unit to his own under the command of Colonel George Lindsay.<sup>166</sup> What is important is that the High Command were also experimenting with new methods of war and that Brutinel's Brigade was part of that experiment.

McNaughton was determined that no negative lessons would be learned from the use of barrage fire but circumstances overtook this and the war ended before anything more became of it. The dispute between Brutinel and McNaughton came very late in the war and had no real effect on the allocation of resources between artillery and machine guns. The quarrel fizzled out and had no effect of future force deployment. With machine guns becoming lighter and more mobile, and with the introduction of lighter mortars, use of machine guns as light artillery became redundant. This was not on the back of criticism by McNaughton but rather the result of continuing development of infantry weapons. No evidence to date has been uncovered to suggest that these concerns were raised at the time.<sup>167</sup> Ian M. McCulloch claims that Brutinel and McNaughton carried on a war of words about the relative merits of their respective weapons systems.<sup>168</sup> But this assertion is based on an impression created by McNaughton's biographer, John Swettenham failed to substantiate any of his arguments with solid evidence. Furthermore, that fact that this disagreement between Brutinel and McNaughton occurred a long time after the war addresses the question about whether rivalry drove innovation in this instance. We know that each officer pushed this own weapon but it was only after the war that they started criticising each other and it was only in the context of protecting their reputations. Currie had regard for both McNaughton and Brutinel and never seems to have criticised either. He did not openly side with one or the other so it is difficult to see if opposition from one side affected the developments of the other. This spat between Brutinel and McNaughton demonstrated that there were dissenting voices raised against the development of machine guns and it was not all plain sailing for Brutinel. McNaughton remained in Canada and

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<sup>166</sup> War diary, Machine Gun Officer Canadian Corps, Sept. 1918 (Canadian Great War Project, Appendix iii). Lindsay's Brigade consisted of two machine gun battalions, eight armoured cars, one cyclist battalion and one battery of trench mortars with motor transport. Griffith, *Battle tactics of the Western Front*, p. 129.

<sup>167</sup> See War diaries of McNaughton contained in War diary, Headquarters Canadian Corps Heavy Artillery, Mar. 1917- Nov. 1918, and the war diaries of Brutinel contained in War diary, Machine Gun Officer Canadian Corps, Nov. 1916-Apr. 1919, in the Library and Archives Canada. There are no references to this supposed conflict in either McNaughton's or Brutinel's war diaries or in the Currie Papers.

<sup>168</sup> McCulloch, 'A war of machines', p. 86.



went on to have successful career in the army, whereas Brutinel returned to France and became somewhat forgotten in Canada. The open culture of the Canadian Corps is superbly demonstrated by Currie's treatment of Brutinel whose skills and ideas were recognised early on and led to rapid promotion. His ideas were adopted promptly and became so successful that they spread across the rest of the British Army exemplifying a form of horizontal innovation.

John Henry Parker follows the definition for an innovator, following the rules set out by Posen in that he acted as a military maverick in trying to use his civilian links with President Roosevelt to get his machine gun doctrine accepted by a sceptical military. His ideas were also inhibited by General Pershing who acted as a gatekeeper along the lines as described by Jungdahl and Macdonald.<sup>169</sup> Brutinel was a military innovator who blossomed under the leadership of General Currie. He was allowed to develop his ideas for motorized machine gun units and barrage fire in the unique culture of the Canadian Corps, which followed the theories of military culture as outlined by Farrell and Murray. Using the theory of Robert Foley and horizontal innovation it is clear that George Lindsay while working in the Machine Gun School at Grantham and the Small Arms School at Camiers can be described as an innovator. R.V.K Applin developed machine gun doctrine in the pre-war period, which was rejected by inhibitors in the War Office, he collaborated with Brutinel to develop a machine gun barrage for the British Army at the Battle of Messines and he led the transnational innovative Machine Gun Mission to America in 1917.

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<sup>169</sup> For a fuller exploration of Jungdahl's and Julia M. Macdonald's ideas see pages 356-61.

## CONCLUSION

The aim of this thesis has been to examine significant developments in the advancement of machine gun doctrine during the period 1898 to 1918. It has attempted to assess the relative importance of the contributions of four of the most influential figures involved, and to gauge the significance of developments in machine gun doctrine in determining the degree to which machine guns became significant contributions to military victory. As has been highlighted the development of machine gun doctrine can be attributed to a small group of officers who set out the principles that should be followed before the First World War. The challenges (not least cultural and attitudinal resistance) they encountered have been explored. The study has highlighted how initially these innovators were dismissed as ‘cranks’, a response perhaps best exemplified in the case of R.V.K. Applin who was told in 1910 that the War Office viewed his proposal as ‘before its time and should be put away for ten years.’<sup>1</sup> Notwithstanding these challenges, the four officers persevered and finally reached the stage where their ideas were accepted, albeit to varying degrees. Applin and Parker encountered ridicule when publishing their ideas but their arguments were largely recognised as valid in the end. The development of machine gun doctrine was a long drawn out process which began during the early wars of the twentieth century. As this thesis has shown, there was never a single moment of revelation; rather, the process of development was slow and methodical with many delays along the way.

This is the first comprehensive study and a very significant development in the military history of this topic using this focus. Three of these officers (Parker, Applin and Brutinel) conform to Vincent Davis’ definition of military innovators as being individuals who had no interest in personal gain from their crusading efforts.<sup>2</sup> Lindsay must be regarded as the exception since as highlighted in this thesis, he was very concerned about career progression. Setting aside consideration of their motivations for innovation, all four officers devoted their careers to the machine gun service and each was identified as the ‘go to’ person for advice and information on machine guns.<sup>3</sup>

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<sup>1</sup> Applin *Across the seven seas*, p. 227.

<sup>2</sup> For the full definition of an innovator as formulated by Davis see p. 17.

<sup>3</sup> Parker was known as ‘Gatling Gun Parker’ or ‘Machine Gun Parker’, names that he invented for himself. Lindsay was referred to as the ‘high priest of machine guns’ by Brutinel.

In the final analysis, what did each of the four achieve in terms of advancing machine gun doctrine? George Lindsay was the foremost British machine gun officer of the war. He, along with C.D. Baker-Carr, was responsible for the establishment of the Machine Gun Corps. A superb theorist, he was constantly developing new ideas for machine guns. He was zealous in this commitment to developing the M.G.C. using training programmes, new tactics and organisational changes. He was a strong believer in fire and movement and was convinced that it was only through the use of fire power that troops could move around the battlefield. He was focussed on developing the mobility of machine guns and by the end of the war had developed some definite ideas about the mobile battle and how machine guns could fit into that space. He was the dominant intellectual force within the M.G.C. He spent most of the war in the machine gun schools at Grantham and Camiers. While at Camiers, Lindsay was responsible for writing SS192, the final and most comprehensive machine gun manual of the war. He had help from his fellow instructors at Camiers, but unfortunately, he was not fully in control of the process and the end result was in his own words ‘somewhat of a jumble’.<sup>4</sup>

Throughout the war, Lindsay worked closely with the Canadian officer, Brigadier General Raymond Brutinel in developing machine gun doctrine in the British service. Brutinel spent more time in the field and to a certain extent he acted as the sounding board for the development of new tactics. Once he developed something new, he passed it to Lindsay who turned it into doctrine for the wider British Army. This practice did not always work smoothly and at one stage Brutinel was angry that his ideas were being ignored by the teaching staff in Grantham. Lindsay intervened in this dispute and the officer in question was disciplined. Brutinel quite clearly developed barrage fire and mobile machine gun units and Lindsay was responsible for integrating them into the British Army. Lindsay was appointed D.I.M.G.U. of the First Army in January 1918. This was the highest operational machine gun post in the British Army and allowed him to develop doctrine without hindrance. Finally, he was recognised as the supreme British machine gunner. Significantly, Lindsay received different degrees of support from his superior officers which had a knock-on effect on his progress. Generals Horne and Hill both allowed him considerable latitude whereas General Lucas was critical of Lindsay and the machine gun service and wanted to make changes.

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<sup>4</sup> Letter regarding proof of ‘The tactical employment of machine guns’, 2 July 1918 (B.T.M., Lindsay Papers E.2004.2138.D.29).

Brutinel was the highest ranked machine gun commander of the war and can justifiably be seen as the one machine gun officer who had the most impact. His ideas became far reaching and extended well beyond the Canadian Corps. He was aided by the fact that the Canadian Corps operated as a separate unit within the British Army and therefore he enjoyed greater autonomy to develop his ideas than did his counterparts in the army in Britain. Brutinel's war record is replete with occasions when he explored new ideas. Some of these were developed further and some were not repeated, such as when he used an Autocar armoured car to tow an 18-pounder up to the front line in December 1915. Ultimately, it did not succeed due to the lack of cross country ability of the lorry, but it showed his constant effort to adopt and develop new ideas. This innovative activity gained him notice and most of his ideas were developed further into useful doctrine. By the end of the war he was a Brigadier General, decorated several times, which was a rare achievement for an ex-French N.C.O. General Currie was very supportive of Brutinel and sought his promotion to Brigadier General in March 1918 when he wrote a glowing reference for him.<sup>5</sup>

In terms of the development of machine gun doctrine, it has been shown that Brutinel was at the forefront of this process in the British Army. The tactic of indirect barrage fire was successful during the war. At Vimy Ridge and Passchendaele, the Canadians proved that a combination of well sited machine guns with a plentiful supply of ammunition could reduce the Germans' ability to defend and ultimately lead to local victories. His record shows that he was constantly focussed on developing the optimum unit to use machine guns effectively. Brutinel and his C.M.G.C. became recognised as the standard bearer in the development of machine gun doctrine during the war. By the end of the conflict, most of the new innovations of machine guns had been trialled firstly by the Canadians. They were also at the forefront of educating the rest of the British Army in machine guns matters. In 1918 Brutinel suggested that the Household Cavalry, a British Army unit, be trained as motorised machine gunners to create a machine gun reserve and he organised the training for this. This is very much in line with what Gary Sheffield says that the Dominion forces (including the Canadian Corps) were at the forefront of

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<sup>5</sup> Currie to Headquarters, Canadian Corps, 29 March 1918 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2).

dissemination of new doctrine across the British Army during this period.<sup>6</sup> Many articles and programmes on Brutinel have been produced by Canadians. All of them rightly proclaim Brutinel as an innovator par excellence.<sup>7</sup> Nevertheless, it does demonstrate the high esteem in which the Canadians held for Brutinel. Overall, he can be judged the most innovative machine gunner of the war and the individual who exerted a real influence on the outcome of the war.

R.V.K. Applin was a career soldier who developed an interest in machine guns from an early age. He was sufficiently interested in the development of machine guns to privately publish a book on the subject which was ignored. Applin explained that he wanted to bring 'into greater prominence the latent possibilities of the machine gun, and the vital necessity for the most complete organisation and tactical training of the detachments.'<sup>8</sup> On the outbreak of the war, he was hoping for a field command but was kept in a training capacity in India until 1916. Transferred to the Western Front in early 1917 as a C.M.G.O., he played a key role in the Battle of Messines where the British Army used barrage fire on a mass scale for the first time. His greatest contribution to the war effort was in leading the British Machine Gun Mission to the U.S. However, on his return to the Western Front, he was dismayed to note that all his teaching had come to naught because General Pershing had different tactical ideas about firepower.

In short, tactical innovation occurred at all levels and across multiple weapon types during the First World War, and machine guns were part of this process. All of the officers had difficulties in persuading their superior officers of the worth of their ideas but this was not uncommon. The armies of the time struggled with the development of doctrine in all its forms along with its dissemination in the form of regulations and tactics. There were very few official structures in any army to allow this to happen. In terms of machine gun tactics, the protagonists each adopted a tactical system that suited their particular circumstances. The British developed barrage fire in order to use machine guns offensively, either as a support in the assault or as a defence against German counter attacks. The French, who were committed to forcing the Germans off their territory,

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<sup>6</sup> Gary Sheffield, 'How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918' in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000), p. 126.

<sup>7</sup> The Battle of Vimy Ridge, part 5, keys to victory <https://www.youtube.com/watch?v=gw3A9H2IP6E> (2 Apr. 2015).

<sup>8</sup> Applin, *Machine gun tactics*, p. v.

adopted a portable machine gun in large numbers to aid their offensive spirit. Meanwhile, the Germans could sit on the defensive and did this by the large scale use of interlocking machine gun nests.

This thesis has sought to highlight the muddle that machine gun doctrine became during the First World War. Firstly, there was a reluctance to accept new tactics and even when some were developed, they were not always acknowledged. For instance, it took a long time for the Lewis gun to be accepted as a replacement for the Vickers gun by the infantry and their officers. In 1917, some infantry commanders were still insisting that Vickers machine guns be positioned in the front line, hence leaving them exposed to destruction by German artillery. There were arguments which ran up to the end of the war with regard to command and control of machine guns. The row over the appointment of D.M.G.O.s versus C.M.G.O.s in the British Army dragged on and it was not until late 1918 that it was finally resolved. This led to inconsistencies in the adoption of machine gun doctrine and the planning of assault tactics. The first C.M.G.O.s were appointed in an advisory capacity, with the result that they could be virtually ignored by infantry commanders. As G.S. Hutchinson correctly pointed out, ‘in the Army one gives and receives orders, one neither gives nor receives advice.’<sup>9</sup> The establishment of separate machine gun battalions did not take place until January 1918 when they were finally sanctioned. In the period from October 1915 to January 1918, Lindsay continually pointed out this omission which he stressed limited the efficiency of the service. Finally, his idea was accepted and put into operation but only in the nick of time for the German Spring offensives. Indeed, by the end of the war, machine gun battalions were only beginning to function as intended.

As part of his original submission to the War Office in 1915, to establish a Machine Gun Corps, Lindsay wanted a proper chain of command for this new machine gun service and also senior officers appointed at G.H.Q. to act as an advocate for the service. This did not happen and it certainly did hamper the development of machine guns in the British service. It was only in mid-1918 that machine gun officers were appointed at army level with the odd title of D.I.M.G.U. and the post of Major General M.G.C. was created at G.H.Q. Unfortunately, the officer appointed, General Cuthbert T. Lucas, had no prior machine gun experience and his reluctance to engage constructively with Lindsay’s

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<sup>9</sup> Cornish, *Machine guns & the Great War*, p. 109.

proposals set the whole process back months at a time when real leadership was required. It is somewhat surprising that Lindsay was never appointed to this post as he had the most experience of any British officer, but he admitted that he had not attended the General Staff Officer training course. In the Canadian Corps, which was equivalent in size to a British Army, this senior post was held by Brutinel who was appointed a brigadier general in May 1918. Hence, he was able to act as an advocate for machine gun doctrine and in fact ended up developing a lot of the doctrine that the British Army used.

Criticism is often levelled at the lack of preparedness of armies at the commencement of the First World War for modern war, and in particular the part that machine guns would play in its outcome. However, messages from the early wars of the twentieth century were not clear cut and could be interpreted in different ways. The Russo-Japanese War was a classic example, where the Japanese succeeded in launching successful attacks against dug-in Russian machine guns. One lesson drawn was that the attacker could succeed if they accepted they would incur high casualties. In all the source material examined for this study, there is only one instance of an individual raising the possibility of machine guns becoming a mass executioner. The issue was raised by Colonel W. N. Congreve during the debate at the R.U.S.I. organised by Applin on machine guns. Addressing the fact that Applin had neglected the issue of how to attack enemy machine guns Congreve's comments were very thoughtful and visionary in the context of the First World War:

He has not told us much about how we are to meet them, that is to say how we are to attack them, to knock them out, or neutralise them. That, for the majority of us, is a greater consideration than the actual handling of the guns themselves. I think if a company officer comes to realise that a machine gun at a thousand yards can produce an absolutely annihilating effect on a suitable target he will appreciate how greatly his responsibility is increased. At present I am perfectly convinced we do not realise that.<sup>10</sup>

Congreve raised a practically awkward question, the problem of attacking an enemy machine gun. This issue was never properly addressed, even by the machine gun officers themselves. The pre-war idea was to use machine guns as an aid to allow the infantry cross the fire zone between the opposing forces, but not necessarily to destroy the

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<sup>10</sup> Applin, 'Machine gun tactics in our own & other armies', p. 1199.

opposing machine guns. It was only during the war that thoughts turned to destroying enemy machine guns.



Figure 66: Canadian Motor Machine Gun Battalion in Cologne 1919. The picture contains 338 troops and 40 Vickers machine guns.

Source: Canadian Expeditionary Force Study Group.

The real challenge for machine guns during the war was to become more mobile. All combatants at the start of the war had some sort of heavy tripod mounted machine gun. It was quickly realised that a lighter machine gun was required to improve mobility, and in the British Army, this led to the use of the Lewis gun.<sup>11</sup> However, that solved only one of the issues and the development of the tank led to firepower becoming truly mobile. This new technology potentially solved the issue of heavy firepower advancing with the infantry but the technical issues were not properly addressed by the end of the war and the tank did not fulfil its true purpose until the Second World War.

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<sup>11</sup> Griffith, *Battle tactics of the Western Front*, p. 130.



The German Army had a different doctrinal approach to machine guns to that of the Allies. The Germans started the war equipped with the MG08 which was a version of Maxim's original gun.<sup>12</sup> Like the Vickers, it was heavy and not portable around the battlefield. Instead of developing a completely new light machine gun like the Lewis, the Germans just made a lighter version of the MG08. Brought into service in 1916 as the MG08/15, it was considerably lighter but tactically it continued to be used in the same way.<sup>13</sup> The German Army believed in defence in depth, with the front lines held by scores of machine gun troops. This allowed them to defend long lines with fewer troops than the equivalent Allied lines which was similar to Lindsay's idea of using machine guns as economisers of men. As the German Army switched to the offensive in 1918 with the use of *sturmtruppen*, they developed a new type of machine gun, the sub machine Bergmann MP 18. It used pistol ammunition and was ideal for close combat in trench warfare.<sup>14</sup> Future machine gun development would focus on weapons of this type as the importance of fire superiority continued to evolve.

This thesis focussed on the use of machine guns and development of machine gun doctrine in the British and Canadian armies which led the way in both during the First World War. The focus of this study has been limited to machine gun use on the Western Front. There was little learning transfer between the British Army on the Western Front and those of the Middle East with regard to machine guns.<sup>15</sup> Furthermore, this study has concentrated on the doctrine of the heavy machine gun with scant attention paid to the evolution of light machine guns which is another area for fruitful complimenting research.<sup>16</sup>

It is interesting to note that all of the recommendations proposed by the innovators were acted upon in some shape or form and, as evidenced in their writings, their complaints were largely about the degree to which the adopting of their ideas was delayed by inaction. This thesis has set out the achievements of these four officers who

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<sup>12</sup> Longstaff & Atteridge, *The book of the machine gun*, p. 145.

<sup>13</sup> Cornish, *Machine guns & the Great War* p. 126.

<sup>14</sup> *Ibid.*, pp 116-7.

<sup>15</sup> There was a specific machine gun manual issued by the General Staff, in Dec. 1916, *Notes of the employment of machine guns in desert warfare in Egypt*. It was only five pages and mostly dealt with the conditions of the desert and the effects of climate on machine guns. George Lindsay while commander of the Small Arms School in Camiers did correspond with officers from the Middle East Theatre but there is no evidence that this correspondence influenced him in developing his ideas.

<sup>16</sup> Machine guns mounted on aircraft and machine guns used as anti-aircraft guns have not been explored due to the pressure of space. There is sufficient literature on those subjects published on this topic. The best example is George Chinn's *The machine gun*.

were so significant in driving the development of machine gun doctrine in this era. Brutinel and Lindsay contributed to the development of 'all arms warfare' with their organisation of mobile units in the last months of the war. Their contributions have been somewhat forgotten and others have been identified with this development. While Brutinel developed ideas and methods of mobile warfare very early on in the war, these were actually only deployed during the last months of 1918. The C.M.M.G.B. was his idea and the first such unit in the British Army and by the end of the war it had proved its efficiency in battle.<sup>17</sup> When used as a mobile reserve in June 1916 at Mount Sorrell and in March 1918 on the Somme, it played a key role in the Allied forces achieving victory. It was less successful in the 100 Days Offensive but again its deployment and performance proved that mobile machine guns could be decisive once the vehicles improved. The 100 Days Offensive was an intense period of warfare and the Canadians were in the thick of the action. Brutinel and the C.M.G.C. played a key role in the battle with varying degrees of success. The Canadian Independent Force or Brutinel's Brigade was a new type of unit that demonstrated the future of mobile warfare. While not ideal and despite being impeded by a lack of equipment, the Brigade did achieve a reasonable amount of success. It was used to very good effect as a flanking force with the French at Amiens and as an advance guard in the pursuit of the Germans in the last days of the war. Contemporary commentators noted this success but also accepted that some of its failures were due to a lack of true off-road capacity.<sup>18</sup> But it needs to be emphasised that adapting for mobile warfare caused problems for the whole of the Canadian Corps and not just the machine gunners, so it is unfair to single them out for criticism. In fact, very significantly Brutinel's Brigade adapted quicker than any other unit on the Western Front.

By the end of the war the Canadian Corps had developed a very sophisticated type of warfare, which – to modern eyes – is identifiable as an early form of combined

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<sup>17</sup> Griffith, *Battle tactics on the Western Front* p. 161. A cavalry battlegroup was formed at High Wood in July 1916 which contained field engineers with bridges, two armoured cars, a machine gun squadron and a field artillery battery. Kenyon, 'British cavalry on the Western Front 1916-1918', p. 105. On the 26 March 1917, The 9<sup>th</sup> Light Armoured Car Battery was attached to the 2<sup>nd</sup> Indian Cavalry Division with six Rolls Royce armoured cars. This force named 'Ward's Force' after its commander, attacked Roisel as part of the Battle of Arras. The armoured car attack was successful but the cavalry struggled in the marshy ground. This is one of the first recorded instances of combined armoured car and cavalry cooperation. These units were built around cavalry whereas Brutinel's unit was based around mobile machine gunners as core troops.

<sup>18</sup>Field Marshal Sir Douglas Haig to 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 24 August 1918, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 9, File 19). Field Marshal Sir Douglas Haig sent a congratulatory note which stated 'the gallant and skilful co-operation of the armoured cars and motor machine gun batteries is worthy of the highest praise.'

warfare. The technology and equipment was not yet fully developed but the tactical thinking was in place and Brutinel played a significant role in this. If the war had continued into 1919 it is clear that this tactical development would have continued, but the war ended and his ideas were forgotten by a war-weary nation. Lindsay also played a significant role in the development of mobile warfare in the British Army. Working closely with Brutinel and with the experience of the Battle of Cambrai in November 1917, he was determined to develop a similar breakout mobile force. Supported by his commanding officer, General Horne, he put together a combined all-arms brigade for the Battle of Arras, but it was not used. Lindsay after the war was to develop an interest in mechanised warfare and combined his First World War experience with his experiences in Iraq to further this aim. Writing in 1927 when he was the Inspector of Royal Tank Corps, Lindsay identified these embryonic mobile machine gun units as the forerunner of mechanised brigades that the army were then attempting to develop.<sup>19</sup> He noted that by the middle of 1918, the British and Canadian Armies had eleven motorised machine gun units equipped with 632 Vickers machine guns.<sup>20</sup> The extent of such forces available to the British Army is not generally realised as they were not fully utilised in battle other than by the Canadians. The influence of Brutinel and Lindsay on developments of mechanised forces during the inter war period needs further investigation and is outside the scope of this thesis.

And what of the Machine Gun Corps? Was it a success or failure? Established by Lindsay and Baker-Carr in 1915, it was very much a product of its time and place. It was established to train and streamline the supply machine gunners, which was what the War Office had planned. However, the officer element within the corps thought otherwise and wanted to develop something different. Led by Lindsay they developed the Machine Gun Corps with viable tactics that by the end of the war had been turned into a very efficient fighting unit. How did this come about? It was largely due to men like Lindsay who through perseverance swayed the General Staff into accepting his ideas. Along the way, people who still believed in the value of cold steel, objected to this new unit. What these people did not realise was that machine guns were set to stay. Some enlightened officers supported the M.G.C. and agreed with their ideas and slowly the machine gunners

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<sup>19</sup> Notes of employment of motorised machine gun squadrons, Apr. 1927 (B.T.M., Lindsay Papers E.2004.2685. E.22).

<sup>20</sup> Ibid.

persuaded the naysayers. But it took until 1918 for the elements that Lindsay suggested in his original proposal to be put in place, and he was right to point out that these omissions in organisation put the efficient running of the M.G.C. in doubt. The learning that went on in the development of the M.G.C. demonstrates that machine guns played a key role in turning the British Army into a highly effective battle-winning all-arms force as articulated by Gary Sheffield.<sup>21</sup>

The tactic that the M.G.C. is most identified with is barrage fire. Proposed by Applin, developed by Brutinel, and propagated across the British Army by Lindsay, it was not without its detractors. Heavy machine guns had to be withdrawn from the front line in order to develop barrage fire and this was not popular with the infantry. The replacement Lewis gun took a while to be accepted by the infantry and it was not until 1917, when sufficient numbers were available, that this issue subsided. Turf wars over resources are always part and parcel of large organisations and the armies of the First World War were certainly prime examples. Some of the opposition to the transfer of resources to the M.G.C. came from artillery officers who believed that barrage fire was overly complicated and could be done with howitzers at a fraction of the cost. The Canadian Colonel Andrew McNaughton carried on a war of words with Brutinel over this in the last months of the war.<sup>22</sup>

Lindsay liked to view his beloved Corps as an elite band of men, but there is evidence to suggest that some of the gunners were soldiers of doubtful quality. To a certain extent any new force looking to forcefully recruit from the existing infantry pool would be seen as a dumping ground by the infantry officers for their less capable troops, and this is probably what happened. Lindsay and the other pioneers sought the best possible recruits for the machine gun service and Applin wrote in 1909 that

the best and nothing but the best is necessary to the successful employment of machine guns, and the importance of obtaining the very best officers as section commanders is so great that there is reason to doubt the utility of having machine guns at all if they are not commanded and handled by those who are in every way expert in their use.<sup>23</sup>

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<sup>21</sup> Boff, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918*

<sup>22</sup> McCulloch, 'A war of machines', p. 86.

<sup>23</sup> Applin, *Machine gun tactics*, p. 232.

However, the reality was different. There was a constant battle to weed out the unsuitable recruits that were sent to the M.G.C. It is hard to quantify the numbers but Paddy Griffith noted this and claimed that the M.G.C. never attained the same status as the Tank Corps or the Royal Flying Corps who genuinely attracted enterprising recruits to its ranks and benefitted from their input.<sup>24</sup>

The mishandling of promotions and advancement within the M.G.C. meant that experienced officers passed through the organisation rather than selecting machine guns as their first choice. According to Lindsay and Brutinel, this had the effect of wasting resources as trained machine gun officers were lost to their units. In the short term this was undoubtedly so, but having officers who understood machine guns in the general body of the officer corps was recognised as highly desirable. Because of their detailed machine gun knowledge, they understood the tactical dilemma when deploying machine guns to support the infantry. But while there was a long-term benefit arising from this practice, there were time constraints involved in training machine gun officers, and reassigning them to infantry commands had the effect of wasting time and effort. It was only in the last stages of the war that these issues were addressed to the satisfaction of Lindsay and Brutinel.

One of the key moments in the development of machine gun doctrine during the war was the demonstrations of barrage fire to Field Marshal Haig and his senior generals on the sands at Camiers during the summer of 1917. These were organised by Lindsay and showcased the very latest developments in the technique. Haig was sufficiently impressed to order machine gun barrages to be used from then on in all major attacks. He also praised the offensive use of machine guns in his annual despatch for 1917 when he wrote 'the machine gun barrage has taken a definite place with the artillery barrage in covering the advance of our infantry, while the lighter forms of machine guns have proved of great assistance in the capture of hostile strong points'.<sup>25</sup> Applin, Lindsay and Brutinel all attended these demonstrations and noted their importance in spreading the word about the capabilities of machine guns.

Finally, by early 1917 machine guns were accepted as offensive weapons. This is exemplified in Haig's address to the Applin-commanded New Zealand machine gunners after the Battle of Messines, when commenting about the reports on the work of the

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<sup>24</sup> Griffith, *Battle tactics on the Western Front*, p. 128.

<sup>25</sup> J. H. Boraston(ed.), Sir Douglas Haig; despatch of 25 December 1917, p. 140

machine guns in that operation, he considered it worthy of 'text book repetition' and stated that machine gun development was only in its infancy.<sup>26</sup> This statement reveals the lack of understanding that had dogged the machine gun in the early years of the war. It has taken nearly two and a half years of war for offensive machine guns tactics to be finally accepted by the British High Command.

By the end of the First World War automatic weapons were embedded into mainstream military systems. Machine guns had progressed in turn from the heavy tripod mounted gun to light machine guns to automatic rifles to early sub machine guns. A new heavier machine gun category had been created with the introduction of the .5 inch Browning and its equivalent the 12.7mm French Hotchkiss. The main protagonists of the war took different views on the future of machine guns. The British abolished the Machine Gun Corps in 1922 and integrated the Vickers machine guns back into infantry formations. This disbandment was partially reversed in 1936 when some infantry battalions were reformed into machine gun battalions. Acting as a divisional reserve, they were tasked with supporting infantry with indirect fire using Vickers machine guns and 4.2 inch mortars.<sup>27</sup> The Germans on the other hand in the inter-war period concentrated on a dual purpose machine gun. The MG34 was able to fire from a bipod in the light machine gun role or as a heavy machine gun using a tripod. They never developed a .5 inch heavy machine gun.<sup>28</sup>

The degree to which these officers influenced each other remains unclear. Certainly, there is strong evidence that Brutinel and Lindsay worked closely together. Applin on the other hand did play a role in the earlier part of the war with the publication of his book in 1910. He was one of the first C.M.G.O.s appointed and his work at the Battle of Messines led to barrage fire being adapted for use in all the British Army. He attended the demonstrations of barrage fire in Camiers during Haig's visit and was sufficiently impressed by the work of Lindsay to bring his 'strategical [sic] paper' to America as part of his training material. Parker was the teacher for them all and the source of the majority of machine gun knowledge in the early part of the twentieth century. His articles and books discussed all the major areas and scenarios where machine guns would be used in future wars. He did not predict the First World War, but he

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<sup>26</sup> Luxford, *With the machine gunners in France & Palestine*, p. 82.

<sup>27</sup> Hutchinson, *Machines guns*, p. 336.

<sup>28</sup> Ian V. Hogg and John Batchelor, *The machine-gun* (London, 1976), p. 44.

certainly pointed out how machine guns could be used effectively to make a significant contribution towards ensuring victory. Applin was aware of Parker's work and quoted him in his book in 1910, and if Lindsay or Brutinel read Applin's book, then they too were undoubtedly aware of Parker's work. It is of interest to note that Lindsay in all his correspondence never mentioned Applin or Parker. This was despite the fact that he met Applin in Malta in 1905, when they served briefly together and practiced machine guns on the sand and despite Parker having attended a machine gun course in the Machine Gun Training Centre in Grantham on his fact finding mission to England in May 1917.

This thesis has examined the contributions of these officers as military innovators. As has been highlighted throughout, both the innovators and their innovations conform to varying degrees with a range of models and concepts that provide an overarching interpretative framework for assessing the significance of their contribution towards the development of machine gun doctrine in this era. Murray has emphasised that there is no grand theory of innovation or one model that can be applied to military matters and notes that Stephen Rosen has shown the difficulties of attempting to develop one grand theory.<sup>29</sup> Moreover, Rosen has highlighted how different theorists have developed conflicting ideas rather than establishing causal relationships.<sup>30</sup> This is certainly evident in the case of machine gun doctrine, as elements of concepts and models proposed by the different theorists apply to the work of these officers in part. Innovation was in its earliest form during the First World War and it was not properly understood; yet, in the case of machine guns as this thesis has sought to demonstrate, it did occur.

The total number who served in the M.G.C. was 11,500 officers and 159,000 other ranks of whom 1,120 officers and 12,671 other ranks were killed and 2,881 officers and 45,377 of other ranks were wounded, missing or taken as prisoners of war.<sup>31</sup> This was a casualty rate of 34.7% for officers and 36.5% for other ranks which earned them the nickname the 'suicide club'. The M.G.C. was officially disbanded on 15 July 1922 with little fanfare. Lindsay and the M.G.C. left a legacy which was the development of tanks as machine gun carriers. The unit history of the C.M.G.C. noted that 5,777 machine gunners out of 16,000 became casualties; that casualty rate of 36% was much higher

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<sup>29</sup> Murray Williamson, Allan R. Millet (eds.), *Military innovation in the interwar period* (New York, 1998), p. 5.

<sup>30</sup> *Ibid.*

<sup>31</sup> The inscription on rear of the memorial to the Machine Gun Corps in Hyde Park London.

than for either the Canadian infantry or artillery.<sup>32</sup> This shows that machine gunners were especially targeted by the Germans.<sup>33</sup> In the same manner, Allied forces sought to destroy enemy machine guns as they were identified as a particularly effective weapon. As a defensive weapon, well sited and protected by barbed wire and concrete, machine guns made stalemate on the Western Front inevitable. The task of determining how to attack and neutralise them took years of trial and error before a solution was found. This could have been achieved earlier if the ideas of Parker, Applin, Lindsay and Brutinel had been taken on board when first proposed. Machine guns were the second highest killer after artillery during the war with an estimated 38.91% of all casualties caused by small arms fire (including machine guns).<sup>34</sup> The history of machine guns as defensive weapons has been well documented but the emergence of machine guns as offensive weapons has been less so. This thesis has sought to address this lacuna in scholarship. All of the innovators brought this offensive capacity to the attention of their superiors and highlighted the high number of casualties inflicted by the offensive use of machine guns. Brutinel famously told his commanding officer to question the German prisoners about how effective machine guns were in the attack.<sup>35</sup> After walking the battlefield of Vimy Ridge, Applin noticed how many of the German dead had been hit in the upper body by machine gun bullets.<sup>36</sup> British machine guns helped to stop the German attacks in 1918 and there are many incidences of retreating troops rallying around machine guns and turning to face the Germans.<sup>37</sup> Machine guns were hugely important in the First World War both in the defence and attack and the Allies had the best mix of machine gun doctrine to maximise their efficiency and impact in combat. Innovations and adaptations in

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<sup>32</sup> Grafton, *The Canadian "Emma Gees"*, p. 214.

<sup>33</sup> Tactical resumé of army machine gun reports for the month of September 1917, 28 October 1917, (L.A.C., 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 1914-1919. RG9-III-C-4, R611-157-0-E.4386, Folder 2, File 9). Special targeting of machine guns by the Germans was noted by the Second Army in the tactical resumé for September when it was recorded that 'the enemy now searches for machine gun batteries as much as he does for artillery.' Lieutenant General Arthur Currie, G.O.C Canadian Corps to Lieutenant Colonel Raymond Brutinel, 10 November 1917 (L.A.C. Currie papers, General correspondence, MG 30 E100 Vol. 1-2). Currie wrote to Brutinel after the Battle of Passchendaele to convey his appreciation for the efforts of the Canadian machine gunners and said 'I regret that the casualties have been so high but these have resulted from the special efforts made by the enemy to destroy the machine gun crews from whom they suffered so much.'

<sup>34</sup> Saunders, 'A muse of fire British trench munitions, their invention, manufacture and tactical employment on the Western Front, 1914-18' p. 28. n 58.51% of BEF casualties were caused by high-explosive 38.91% were caused by small arms fire (including machine-guns) and the balance of 2.18% was caused by gas, grenades and edged weapons.

<sup>35</sup> Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade', 1914-18 (C.W.M. Archives, Textual Records, 58A 1195.6) (transcript of interview with Brutinel), tape 19.

<sup>36</sup> Applin, 'Lecture on the machine guns at the Battle of Messines', p. 32.

<sup>37</sup> War diary, 33<sup>rd</sup> Machine Gun Battalion, 12-19 April 1918 (T.N.A., W.O., 95/2417/2)



the type of guns deployed, how they were organised and the tactics that they used all contributed to this enhanced performance and greatly increased the contribution of machine guns in achieving military victory. This machine gun doctrine is largely down to the work of four officers, Parker, Applin, Brutinel and Lindsay whose role in victory this thesis sought to highlight.

It has to be acknowledged that by the end of the war the tripod mounted machine gun, having reached its zenith, was overtaken by lighter, more modern versions. It had been hugely successful in both defensive and attack but events had also overtaken its role. The infantry became armed with pistol calibre machine guns which placed less emphasis on heavy machine guns as the producer of fire. Also significant was the development of the tank as a machine gun carrier which meant that there was now a weapon that could nullify the main advantage of the heavy machine gun – that of static defence. The machine gun would no longer be used to mow down advancing infantry as armoured vehicles now provided the necessary shelter. The machine gun had changed the face of battle but its part in future wars would also change. This thesis has endeavoured to demonstrate that much of the development in machine gun tactics and doctrine was driven by this handful of pioneering officers serving in the British Army during the First World War.



Figure 67: The Machine Gun Corps Memorial, also known as ‘the Boy David’, is situated at Hyde Park Corner, London.<sup>38</sup>

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<sup>38</sup> The inscription reads ‘Saul has slain his thousands but David his tens of thousands’ a reference to the opening line from a lecture by George Lindsay in 1916.

# BIBLIOGRAPHY

## A. PRIMARY SOURCES

### 1. Public Records

#### Australia

##### *Canberra*

##### Australian War Memorial (A.W.M.)

Australian Imperial Force war diaries (A.W.M 4)

War diary, 4th Machine Gun Company, A.I.F., June 1917 (A.W.M. 4, 24/9/12).

War diary, 9th Machine Gun Company, A.I.F., June 1917 (A.W.M. 4, 24/14/8).

War diary, 10th Machine Gun Company, A.I.F., June 1917 (A.W.M. 4, 24/15/9).

War diary, 11th Machine Gun Company, A.I.F., Apr. 1916 - Feb. 1918 (A.W.M. 4, 24/16/1).

War diary, 12th Machine Gun Company, A.I.F., June 1917 (A.W.M. 4, 24/17/16).

War diary, 13th Machine Gun Company, A.I.F., June 1917 (A.W.M. 4, 24/18/12).

Monash Papers, book 14, 10 Feb.-30 Mar. 1917 (A.W.M., RCDIG0000618).

Monash Papers, book 15, 1 Apr.-10 May 1917 (A.W.M., RCDIG0000619).

Monash Papers, book 15, 10 May- 9 June 1917 (A.W.M., RCDIG0000620).

Monash Papers, book 15, 10 June-31 July 1917 (A.W.M., RCDIG0000621).

Monash Papers, book 16, 1 Aug.-30 Sept. 1917 (A.W.M., RCDIG0000622).

#### Canada

##### *Ottawa*

##### Canadian Broadcasting Corporation Digital Archives

Flanders Fields radio programme 1964 (transcript).

##### Canadian War Museum Ottawa

‘Written account of the formation of the 1<sup>st</sup> Canadian Machine Gun Brigade and their service in the Great War in the Great War’, 1914-1918 (Textual Records, 58A 1195.6).

General Sir Arthur Currie Collection Archives (Textual Records, 19801226-267 to 19801226-293).

*The Canadian Machine Gunner*. Seaford, UK: Canadian Machine Gun Corps., 1918  
Collection:[1917-1919] PER UA 602 C3 C363.

Vimy [sound recording] CBC Publications, 1965, 19790424-001.

Library and Archives Canada, Ottawa

Brutinel Papers

First World War maps of France, 1918. MG30 E414  
Raymond Brutinel 1940 -1955 RG117 2046  
Brutinel, Raymond - Brig-Gen. 1914-1939 RG24-C-1-a. 23879.636-2-1  
Brig. Gen. Brutinel. 1914-1921 RG9-III-D-2. 4810. R. B. 7.

Borden Papers

General correspondence MG26-H. 36. C-4229.  
General correspondence MG26-H.189/X1. C-4386.  
General correspondence MG26-H. 100. C-4331.  
General correspondence MG26-H. 149. C-4363.

Clifford Sifton Papers

General correspondence 1889-1926. MG27-IID15.

Albert Edgar Powley papers

Correspondence MG30 – E333.R2100-0-XE, Vol 3, 1961-65, correspondence Raymond Brutinel  
Correspondence MG30 – E333.R2100-0-XE, Vol 3, May 1963, interview Raymond Brutinel

Currie Papers

General correspondence, MG 30 E100 Vol. 1-2  
General correspondence, MG 30 E100 Vol. 6, Brutinel letters  
General correspondence, MG 30 E100 Vol. 6, McNaughton letters  
Memoranda and reports, MG 30 100 Vol. 35- 41.  
News reports – Battles of 1917. MG 30 100 Vol. 45.  
Pamphlets, MG 30 100 Vol. 48 - 51.  
Diary of events, 1914-1918 MG 30 100 Vol. 42  
Commander's logs, MG 30 100 Vol. 43  
Wartime Diary June 1916 – February 1917, MG 30 100 Vol. 52.

Canadian Machine Gun Corps

1<sup>st</sup> Canadian Motor Machine Gun Brigade 1914-1919. RG9-III-C-4, R611-157-0-E.4344  
1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4345  
1<sup>st</sup> Canadian Motor Machine Gun Brigade 1914-1919. RG9-III-C-4, R611-157-0-E.4346  
1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4347  
1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4348

1<sup>st</sup> Canadian Motor Machine Gun Brigade\_1914-1919. RG9-III-C-4, R611-157-0-E.4386  
1<sup>st</sup> Canadian Motor Machine Gun Brigade\_13 June 1915- 28 February 1917 RG9-III-C-3  
4986  
1<sup>st</sup> Canadian Motor Machine Gun Brigade 01 March 1917 – 05 April 1919 RG9-III-C-3  
4987  
2<sup>nd</sup> Canadian Motor Machine Gun Brigade 05 June 1918 – 30 April 1919 RG9-III-C-3  
4987, 629  
Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 3944  
Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 3945  
Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 3951  
Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 3954  
Canadian Machine Gun Corps 1914-1919. RG9-III-C-1, R611-377-3-E. 3963

#### General Staff

1<sup>st</sup> Canadian Division Headquarters 1914-1919. RG9-III-C-3, R611-68-1-E.  
1<sup>st</sup> Canadian Infantry Brigade Headquarters 1914-1919. RG9 –III-C-3, R611-69-3-E  
2<sup>nd</sup> Canadian Infantry Brigade Headquarters 1914-1919. RG9-III-C-3, R611-75-9-E  
3<sup>rd</sup> Canadian Infantry Brigade Headquarters 1914-1919. RG9-III-C-3, R611-80-2-E  
43th Canadian Infantry Battalion Headquarters 1914-1919. RG9-III-C-3, 4196  
52<sup>nd</sup> Canadian Infantry Battalion Headquarters 1914-1919. RG- III-C-3. 4197  
Lipsett - Brig. Gen. 1915-1917. RG 9 III-A-1. 171. 6-L-148.

#### Peter Worthington papers

Correspondence R13880 O-X-E, 45, 10, correspondence between Raymond Brutinel and  
A.E. Powley  
Correspondence R13880 O-X-E, 6, 24, Raymond Brutinel and Motor Machine Gun  
Brigade

#### Canadian Great War Project

War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, June 1915-Aug. 1916.  
War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Sept. 1916-Feb. 1917.  
War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Mar. 1917-Aug. 1917.  
War diary, 1<sup>st</sup> Canadian Motor Machine Gun Brigade, Sept 1917-May 1919.  
War diary, 2<sup>nd</sup> Canadian Motor Machine Gun Brigade, May 1918-Apr. 1919.  
War diary, Machine Gun Officer Canadian Corps, Nov. 1916-July 1918.  
War diary, Machine Gun Officer Canadian Corps, Aug. 1918-Sept. 1918.  
War diary, Machine Gun Officer Canadian Corps, Oct.1918- Apr. 1919.  
War diary, Borden Motor Machine Gun Battery, Dec. 1914-June 1918.  
War diary, Eaton Motor Machine Gun Battery, Feb. 1916-June 1918.  
War diary, Yukon Motor Machine Gun Battery, Feb. 1916-June 1918.  
War diary, 1<sup>st</sup> Canadian Machine Gun Battalion, Mar. 1918-Mar. 1919.  
War diary, 2<sup>nd</sup> Canadian Machine Gun Battalion, Mar. 1918-Mar. 1919.  
War diary, 3<sup>rd</sup> Canadian Machine Gun Battalion, Mar. 1918-Mar. 1919.  
War diary, 4<sup>th</sup> Canadian Machine Gun Battalion, Mar. 1918-Mar. 1919.  
War diary, 1<sup>st</sup> Canadian Division General Staff, 1 Jan. 1917-31 Jan. 1917.  
War diary, Canadian Corps General Staff, Sept. 1915-Nov. 1915.  
War diary, Canadian Corps General Staff, Apr. 1916.  
War diary, Canadian Corps General Staff, June 1916.

War diary, Canadian Corps General Staff, July 1916.  
 War diary, Canadian Corps General Staff, Aug. 1916-Sept 1916.  
 War diary, Canadian Corps General Staff, May. 1917.  
 War diary, Canadian Corps General Staff, June. 1917.  
 War diary, Canadian Corps General Staff, July. 1917-Aug 1917.  
 War diary, Canadian Corps General Staff, Sept. 1917.  
 War diary, Canadian Corps General Staff, Oct. 1917.  
 War diary, Canadian Corps General Staff, Nov. 1917.  
 War diary, Headquarters Canadian Corps Heavy Artillery, Mar. 1917-Nov. 1918.  
 War diary, 1<sup>st</sup> Canadian Machine Gun Company, Jan. 1916-Mar. 1918.  
 War diary, 2<sup>nd</sup> Canadian Machine Gun Company, Feb. 1916-Mar. 1918.  
 War diary, 3<sup>rd</sup> Canadian Machine Gun Company, Mar. 1916-Mar. 1918.  
 War diary, 4<sup>th</sup> Canadian Machine Gun Company, Jan. 1916-Mar. 1918.  
 War diary, 5<sup>th</sup> Canadian Machine Gun Company, Jan. 1916-Mar. 1918.  
 War diary, 6<sup>th</sup> Canadian Machine Gun Company, Feb. 1916-Mar. 1918.  
 War diary, 7<sup>th</sup> Canadian Machine Gun Company, Apr. 1916-Mar. 1918.  
 War diary, 8<sup>th</sup> Canadian Machine Gun Company, Apr. 1916-Mar. 1918.  
 War diary, 10<sup>th</sup> Canadian Machine Gun Company, Aug. 1916-Mar. 1918.  
 War diary, 12<sup>th</sup> Canadian Machine Gun Company, Jun. 1916-Mar. 1918.  
 War diary, 13<sup>th</sup> Canadian Machine Gun Company, Jan. 1917-Mar. 1918.  
 War diary, 14<sup>th</sup> Canadian Machine Gun Company, Feb. 1916-Mar. 1918.  
 War diary, 15<sup>th</sup> Canadian Machine Gun Company, Feb. 1917-Mar. 1918.  
 War diary, 18<sup>th</sup> Canadian Machine Gun Company, Feb. 1917-June 1918.  
 War diary, 19<sup>th</sup> Canadian Machine Gun Company, Feb. 1917-June 1918.  
 War diary, 7<sup>th</sup> Canadian Machine Gun Company, Apr. 1916-Mar. 1918.  
 War diary, 1<sup>st</sup> Canadian Division General Staff, Oct. 1914-Mar. 1919.  
 War diary, 2<sup>nd</sup> Canadian Division General Staff, Mar. 1915-Mar. 1919.  
 War diary, 3<sup>rd</sup> Canadian Division General Staff, Nov. 1915-Mar. 1919.  
 War diary, 4<sup>th</sup> Canadian Division General Staff, Aug. 1916-Mar. 1919.  
 War diary, 1<sup>st</sup> Canadian Infantry Brigade, Oct. 1914-Mar. 1919.  
 War diary, 2<sup>nd</sup> Canadian Infantry Brigade, Sept 1914-Apr. 1919.  
 War diary, 3<sup>rd</sup> Canadian Infantry Brigade, Oct. 1914-Feb. 1919.  
 War diary, 4<sup>th</sup> Canadian Infantry Brigade, Oct. 1914-Mar. 1919.  
 War diary, 5<sup>th</sup> Canadian Infantry Brigade, Jan. 1915-May 1919.  
 War diary, 6<sup>th</sup> Canadian Infantry Brigade, June 1915-May. 1919.  
 War diary, 7<sup>th</sup> Canadian Infantry Brigade, Feb. 1916-Mar. 1919.  
 War diary, 8<sup>th</sup> Canadian Infantry Brigade, Jan. 1916-Mar. 1919.  
 War diary, 9<sup>th</sup> Canadian Infantry Brigade, Feb. 1916-Mar. 1919.  
 War diary, 10<sup>th</sup> Canadian Infantry Brigade, Aug. 1916-Apr. 1919.  
 War diary, 11<sup>th</sup> Canadian Infantry Brigade, Aug 1916-Apr. 1919.  
 War diary, 12<sup>th</sup> Canadian Infantry Brigade, May 1916-May 1919.

Notes on French attacks North-East of Verdun, in Oct. and Dec. 1916 (I-88616).  
 Brutinel's Brigade report on operations (I-88633).  
 M.G. Intelligence, 11 Aug. 1917-31 Dec. 1917 (I-88631).  
 Congratulatory messages, 11 Aug. 1917-17 Nov. 1917 (I-88634).

## England

### *Bovington*

#### Bovington Tank Museum

Lindsay Papers, Series E.2004, boxes A-L.

### *London*

#### British Library

Hunter-Weston papers- Add MS 48355-48368

#### King's College London – Liddell Hart Centre for Military Archives

Bridgeman Papers - GB0099 KCLMA Bridgeman

Godley Papers – GB0099 KCLMA Godley

Horne Papers – GB0099 KCLMA Horne

Liddell Hart Papers- GB0099 KCLMA Liddell Hart B H

Lindsay Papers – GB0099 KCLMA Liddell Hart 15/12

#### The National Archives (United Kingdom)

Cabinet papers

CAB/24/1, 12 Nov. 1915.

CAB 42/5/1, 28 Dec. 1915.

CAB 25/2, Mar. 1918.

CAB 25/3, 22 Feb. 1918.

War Office

Field Marshal Sir Douglas Haig diaries, 1914 -18 (W.O. 256 series).

Notes on the employment of machines guns and the training of machine gunners, 1915 (W.O., 33/718).

Motor Machine Gun Batteries, Apr. 1915 (W.O., 158/288).

Formation of Machine Gun Corps, 1915 (W.O., 32/11239).

Establishment of Machine Gun Training Centre at Grantham, 1915 (W.O., 32/5453).

19<sup>th</sup> Division: Machine guns; tactical and technical lessons learnt, 1917 (W.O., 158/418).

‘Lessons learnt from Messines – Wyttschaete operations – machine guns’, 1917 (W.O., 158/298).

British War diaries

First Army General Staff (W.O., 95/176/7, Apr. 1918).  
 Second Army General Staff (W.O., 95/277/1, Mar.-Apr. 1918).  
 Third Army General Staff (W.O., 95/370/3, Apr. 1918).  
 Fourth Army General Staff (W.O., 95/435/1, Apr. 1918).  
 Fifth Army General Staff (W.O., 95/521/6, Mar. 1918).  
 Reserve Army General Staff (W.O., 95/521/7, Apr. 1918).  
 VII Corps General Staff (W.O., 95/807/1-6, Jan. 1918-Mar. 1918).  
 VIII Corps General Staff (W.O., 95/822/2, Apr. 1918).  
 VIII Corps General Staff (W.O., 95/822/1, Jan. 1918-Jan. 1919).  
 IX Corps General Staff (W.O., 95/835/3, Jan. 1917 – Apr. 1917).  
 IX Corps General Staff (W.O., 95/835/4, May. 1917 – June 1917).  
 X Corps General Staff (W.O. 95/852/4, June 1917).  
 XIII Corps General Staff (W.O., 95/896/2, Dec. 1916-Apr. 1917).  
 XIII Corps General Staff (W.O., 95/895/1, Nov. 1915-Feb. 1916).  
 XIII Corps General Staff (W.O., 95/895/2, Mar. 1916-June 1916).  
 XIII Corps General Staff (W.O., 95/895/3-7, July 1916).  
 XIII Corps General Staff (W.O., 95/896/1, Aug. 1916-Nov. 1916).  
 XIII Corps General Staff (W.O., 95/896/2, Dec. 1916-Apr. 1917).  
 XIII Corps General Staff (W.O., 95/896/3, May 1917-Sept. 1917).  
 XIII Corps General Staff (W.O., 95/896/4, Oct. 1917-Dec. 1917).  
 XIII Corps General Staff (W.O., 95/897/1, Jan. 1918-Apr. 1918).  
 XIII Corps General Staff (W.O., 95/897/2, Jan. 1918-Apr. 1918).  
 99<sup>th</sup> Infantry Brigade (W.O., 95/1368, 2 Mar. 1916-June 1916).  
 99<sup>th</sup> Infantry Brigade (W.O., 95/1368, 3 July 1916-Sept. 1916).  
 99<sup>th</sup> Infantry Brigade (W.O., 95/1368, 4 Oct. 1916- Dec. 1916).  
 99<sup>th</sup> Infantry Brigade (W.O., 95/1369, 1 Jan. 1917- Mar. 1917).  
 99<sup>th</sup> Infantry Brigade (W.O., 95/1369, 2 Apr. 1917- Apr. 1917).  
 33<sup>rd</sup> Machine Gun Battalion (W.O. 95/2417/2, Feb. 1918- Aug. 1919).  
 100<sup>th</sup> Infantry Brigade (W.O. 95/2429/3, Jan. 1918- Apr. 1918).  
 100<sup>th</sup> Machine Gun Company (W.O. 95/2431/3, Ap. 1916- Jan. 1918).  
 1<sup>st</sup> Life Guards (W.O., 95/1155, 1 Oct. 1914-Mar. 1918).  
 4<sup>th</sup> Battalion Machine Gun Guards (W.O., 95/1206, 1 Mar. 1917- Mar. 1919).  
 99<sup>th</sup> Machine Gun Company (W.O., 95/1373, 1 Jan. 1918- Feb. 1918).  
 75<sup>th</sup> Machine Gun Company (W.O., 95/2251/5, 1 Mar. 1916-28 Feb. 1918).  
 7<sup>th</sup> Machine Gun Company (W.O., 95/2244/6, 1 Mar. 1916-28 Feb. 1918).  
 75<sup>th</sup> Infantry Brigade (W.O., 95/2249/3, 1 July 1917-31 Aug. 1917).  
 75<sup>th</sup> Infantry Brigade (W.O., 95/2249/2, 1 Jan. 1917-31 June 1917).  
 74<sup>th</sup> Machine Gun Company (W.O., 95/2247/6, 1 Mar. 1916-28 Feb. 1918).  
 7<sup>th</sup> Infantry Brigade (W.O., 95/2242, 1 June 1917).  
 195<sup>th</sup> Machine Gun Company (W.O., 95/2235/2, 1 Dec. 1916-28 Feb. 1918).  
 11<sup>th</sup> Division Headquarters (W.O. 95/1788/2, June 1917).  
 16<sup>th</sup> Irish Division Headquarters (W.O. 95/1956/1, May 1917 – Dec. 1917).  
 19<sup>th</sup> Division Headquarters (W.O. 95/2054/4, June 1917).  
 23<sup>rd</sup> Division Headquarters (W.O. 95/2168/4 June 1917). 25<sup>th</sup> Division Headquarters  
 (W.O., 95/2224/5, 1 Jan. 1917-31 May 1917).  
 25<sup>th</sup> Division Headquarters (W.O., 95/2224/6, 1 June 1917-31 Dec. 1917).  
 36<sup>th</sup> Ulster Division Headquarters (W.O. 95/2491/4, Jan. 1917 – July 1917).  
 41<sup>st</sup> Headquarters (W.O. 95/2617/1, May 1916 – Oct. 1917).  
 II ANZAC Headquarters (W.O., 95/1032/1, 1 June 1916-31 July 1917).



II ANZAC Headquarters (W.O., 95/1032, 3 June 1917).  
II ANZAC Adjutant & Quarter Master General (W.O., 95/1033, 3 June 1917).  
2<sup>nd</sup> New Zealand Infantry Brigade (W.O., 95/3695, 1 Jan. 1917-Dec. 1917).  
4<sup>th</sup> New Zealand Infantry Brigade (W.O., 95/3712, 1 Mar. 1917-28 Feb. 1918).  
3<sup>rd</sup> New Zealand Rifle Brigade (W.O., 95/3706, 1 May 1918-31 May 1918).  
4<sup>th</sup> New Zealand Machine Gun Company (W.O., 95/3680, 1 Mar. 1917-28 Feb. 1918).  
5<sup>th</sup> New Zealand Machine Gun Company (W.O., 95/3714, 1 May 1917-28 Feb. 1918).  
1<sup>st</sup> New Zealand Machine Gun Company (W.O., 95/3691, 1 Mar. 1917-31 Dec. 1918).  
2<sup>nd</sup> New Zealand Machine Gun Company (W.O., 95/3704, 1 Apr. 1916-28 Feb. 1918).

### ***Shrivenham***

#### Defence Academy of the United Kingdom, Joint Services Command and Staff College Archives

Report of a conference of General Staff officers at the Staff College, 7<sup>th</sup> to 10<sup>th</sup> Jan. 1908.  
Report of a conference of General Staff officers at the Staff College, 18<sup>th</sup> to 21<sup>th</sup> Jan. 1909.  
Report of a conference of General Staff officers at the Staff College, 17<sup>th</sup> to 20<sup>th</sup> Jan. 1910.  
Report of a conference of General Staff officers at the Staff College, 9<sup>th</sup> to 12<sup>th</sup> Jan. 1911.  
Report of a conference of General Staff officers at the Staff College, 15<sup>th</sup> to 18<sup>th</sup> Jan. 1912.  
Report of a conference of General Staff officers at the Staff College, 13<sup>th</sup> to 16<sup>th</sup> Jan. 1913.  
Report of a conference of General Staff officers at the Staff College, 7<sup>th</sup> to 10<sup>th</sup> Jan. 1914.

### ***Staffordshire***

#### Staffordshire Record Office

Congreve papers

## **2. Official publications**

Kuropatkin, Aleksey, *The Russian Army and the Japanese war being historical and critical comments on the military policy and power of Russia and on the campaign in the Far East* (2 vols., New York, 1909).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium, Mons, the Retreat to the Seine, the Marne and the Aisne, August - October 1914* (London, 1922).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium, Antwerp, La Bassée, Armentières, Messines and Ypres, October - November 1914* (London, 1925).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium, Winter 1914-15: Battle of Neuve Chapelle: Battles of Ypres* (London, 1927).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium 1915, Battles of Aubers Ridge, Festubert, and Loos* (London, 1928).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium 1916, Sir Douglas Haig's Command to the 1st July: Battle of the Somme* (London, 1932).

Wilfrid Miles, *History of the Great War based on official documents, Military operations France and Belgium 1916, July 1916 to the end of the Battles of the Somme* (London, 1938).

Cyril Falls, *History of the Great War based on official documents, Military operations France and Belgium 1917, The German Retreat to the Hindenburg Line and the Battles of Arras* (London, 1940).

James E. Edmonds, *History of the Great War based on official documents, Military operations France and Belgium 1917, Messines and third Ypres (Passchendaele)* (London, 1948).

Wilfrid Falls, *History of the Great War based on official documents, Military operations France and Belgium 1917, The Battle of Cambrai* (London, 1948).

Nicholson, G.W.L., *Official history of the Canadian Army in the First World War Canadian Expeditionary Force, 1914-1919* (Ottawa, 1962).

A. Fortescue Duguid, *Official history of the Canadian Forces in the Great War 1914-1919, general series vol. 1 from the outbreak of war to the formation of the Canadian Corps August 1914- September 1915 chronology, appendices, and maps* (Ottawa, 1938).

*Reports of military observers attached to the Armies in Manchuria during the Russo-Japanese War* (3 vols., Washington, 1906).

*Report of the Ministry Overseas Military Forces of Canada 1918* (London, 1918).

Centre of Military History, United States Army in the World War, 1917-19:

Volume 1 *Organization of the American Expeditionary Forces.*

Volume 2 *Policy-forming documents of the American Expeditionary Forces.*

Volume 3 *Training and use of American units with the British and French.*

Volume 4-9 *Military operations of the American Expeditionary Forces.*

Volume 10 *The Armistice Agreement and related documents.*

Volume 11 *American occupation of Germany.*

Volume 12-15 *Reports of the Commander-in-Chief. A.E.F. Staff sections and services.*

Volume 16 *General Orders. G.H.Q. A.E.F.*

Volume 17 *Bulletins. G.H.Q. A.E.F.*

Villiers, Frederic, *Port Arthur three months with the besiegers a diurnal of occurrents* (London, 1905).

War Department, *Reports of military observers attached to the armies in Manchuria during the Russo–Japanese War, Report of Major E. Kuhn, Corps of Engineers* (Washington, 1906).

War Office, *The Russo-Japanese War reports from British officers attached to the Japanese and Russian forces in the field* (2 vols., London, 1908).

Wilson, H.W., *Japan's fight for freedom the story of the war between Russia and Japan* (3 vols., London, 1905).

Wilson, John B., *Maneuver and firepower the evolution of divisions and separate brigades* (Washington, 1998)

### **3. Manuals (originals and reprints)**

Anon, *Complete guide to the Hotchkiss machine gun* (Naval and Military Press edition, Milton Keynes, 2010).

Army War College, *Changes in organization found necessary during progress of the European War* (Washington, 1915).

Army War College, *Notes on recent operations, No. 3* (Washington, 1917).

Army War College, *Study on the development of large calibre, mobile artillery, and machine guns in the present European War* (Washington, 1915).

Bostock, J., *The machine gunners handbook including the Vickers light gun* (London, 1914).

*Equipment manuals for service in Europe, series A, No. 2, Infantry Brigade Machine Gun Battalion* (Washington, 1918).

*Field service manual – mounted infantry* (London, 1899).

*Field service manual 1914 Infantry Battalion (Expeditionary Force), Oct. 1914* (London, 1914).

*Field Service Regulations (Felddienst Ordnung, 1908, of the German Army 1908 – translated by the General Staff, War Office* (London, 1908).

*General Staff, The employment of machine guns, Jan., 1918, S.S. 192* (Naval and Military Press edition, Milton Keynes, 2008).

General Staff, *Infantry machine gun company training, 1917* (Naval and Military Press edition, Milton Keynes, 2009).

General Staff, *Instructions for the training of the British Armies in France*, S.S.152 (London, 1918).

General Staff, *Notes on the employment of machine guns in desert warfare in Egypt, Dec. 1916* (Naval and Military Press edition, Milton Keynes, 2009).

General Staff, *Notes and rules for barrage fire with machine guns, May 1917* (Naval and Military Press edition, Milton Keynes, 2009).

General Staff, *Method of instruction in the Lewis Gun, May 1917, S.S. 448* (Naval and Military Press edition, Milton Keynes, 2009).

General Staff, *Provisional notes on firing at aircraft with machine guns and other small arms, March 1917, S.S. 142* (Naval and military Press edition, Milton Keynes, 2009).

General Staff, *Summary of machine gun intelligence, May, June, July 1917* (Naval and Military Press edition, Milton Keynes 2010).

General Staff, *Tactical summary of Machine Gun operations, Oct., 1917 & Nov-Dec., 1917 S.S. 201* (Naval and Military Press edition, Milton Keynes, 2008).

*Handbook of the German Army (Home and Colonial) August 1914* (Imperial War Museum edition, London, 2002).

Infantry School Staff, *The infantry in battle* (Washington, 1939).

*La Mitrailleuse Anglaise 'Vickers'* (Paris, 1917).

*Machine gunners pocket book* (London, 1917).

*Motor machine gun equipment mark IV 1915 parts list* (Wolverhampton, 1915).

*Operation and tactical use of the Lewis automatic machine rifle based on the experience of the European War, with an introduction by Col. I.N. Lewis* (New York, 1917).

*Report of General John J. Pershing, USA – Commander-In-Chief American Expeditionary Forces, cabled to the Secretary of War* (Nov. 1918).

Robert, Capitaine, *A.B.C. du mitrailleur* (Bourges, 1917).

*School of musketry library – Fort Sill Oklahoma – list of books on shelves November 15, 1916* (Oklahoma, 1916).

Solano, E.J., *Machine gun training* (London, 1916).

*Tactical principles for the employment of machine gun sections – Communicated by the Austro-Hungarian School of Musketry to, and appearing in, 'Streffeur's militarische Zeitschrift' July, August and September, 1910 - translated by the General Staff, War Office (London, 1911).*

*Technical training handbook of the Browning automatic rifle model of 1918 (Fort Sill, Oklahoma, 1918).*

The infantry School of Arms, *Handbook of the Vickers machine gun, model 1915 (Oklahoma, 1918).*

United States Army American Expeditionary, *Report of Superior board on organization and tactics (Washington, 1920).*

Von Merkatz, Friedrich, *New methods of machine gun fire (Washington, 1916).*

War Department, *Changes in organisation found necessary during progress of the European War (Nov. 1915).*

War Department, *Combined infantry and cavalry drill regulations for automatic machine gun caliber .30 model of 1909 (Washington, 1917).*

War Department, *Drill regulations for machine gun platoons infantry United States Army (Washington, 1909).*

War Department, *Handbook on machine gun cart model 1917 (Washington, 1918).*

War Department, *Handbook of the Benet-Mercié machine rifle model of 1909 with pack outfits and accessories (Washington, 1917).*

War Department, *Handbook of the Colt automatic machine gun caliber .30 with pack outfits and accessories (Washington, 1917).*

War Department, *Manuals for commanders of infantry platoons – translated from the French edition of 1917 (Washington, 1918).*

War Department, *Machine gun drill regulations (provisional) 1917 (Washington, 1918).*

War Department, *Machine gun notes no. 1 (Washington, 1917).*

War Department, *Machine gun notes no. 2 from British sources (Washington, 1917).*

War Department, *Notes on recent operations (Washington, 1917).*

War Department, *Notes on the use of machine guns in trench warfare and on the training of machine gun units – compiled from foreign reports (Washington, 1917).*

War Department, *Supplement to machine gun drill regulations (provisional 1917) and provisional machine gun firing manual 1917 (Washington, 1918).*

War Department Office of the Chief of Staff, Second (Military Information Division, *Selected translations pertaining to the tactical use and value of machine guns* (Washington, 1906).

War Office, *Statistics of the military effort of the British Empire during the Great War 1914-1920* (London, 1922).

#### **4. Newspapers**

*Ogden Standard*, 16 Mar. 1917.  
*New York Tribune*, 27 Oct. 1908.  
*New York Tribune*, 10 Mar. 1916.  
*New York Times*, 24 Mar. 1916.  
*New York Times*, 27 Apr. 1918.  
*Northern Advocate*, 8 Apr. 1921.  
*San Francisco Call*, 4 Oct. 1908.  
*San Francisco Call*, 14 Oct. 1908.  
*San Francisco Call*, 22 Oct. 1908.  
*The Times*, 23 Apr. 1915.  
*The Times*, 11 Jan. 1949.  
*Valentine Democrat*, 14 Apr. 1910.  
*Washington Times*, 23 Mar. 1916.

#### **5. Contemporary articles**

Anon., 'Foreign machine gun doctrine' in *Infantry Journal*, xiii, no. 4 (Jan. 1917), pp 756-59.

Anon., 'Machine guns, tactical employment of (translated from the Japanese)' in *Journal of the Military Service Institution of the United States*, xlvii (July 1910), pp 348-64.

Anon., 'Machine guns in battle' in *Infantry Journal*, xiv (July 1917-June 1918), pp 274-83.

Ajax, 'Machine guns: their use and abuse' in *Journal of the Military Service Institution of the United States*, xxiii (June 1898), pp 535-42.

Applin, R.V.K., 'Machine gun tactics in our own and other armies' in *Journal of the United States Cavalry Association*, xx (Sept. 1909), pp 1162-1200.

Applin, R.V.K., 'Tactics of the machine gun' in *Infantry Journal*, xiv (July 1917-June 1918), pp 755-63.

Bargar, B.L., 'An organic unit for machine guns' in *Journal of the Military Service Institution of the United States*, xxxviii (Jan., Mar., May 1906), pp 299-301.

Bissell, H.H., 'The tactical employment of the infantry machine (translated from La Revue d'Infanterie)' in *Journal of the Military Service Institution of the United States*, i (July, Sept., Nov. 1912), pp 100-09, 229-38.

Bissell, H.H., 'The tactical employment of the infantry machine (translated from La Revue d'Infanterie)' in *Journal of the Military Service Institution of the United States*, i (Jan., Mar., May 1912), pp 369-80.

Benson, G.E., 'Machine guns: their tactics and equipment' in *Journal of the Military Service Institution of the United States*, xxii (Jan. 1898), pp 106-46.

Beresford, C.W., 'Machine guns in the field' in *Army and Navy Quarterly*, i, no. 3 (July 1885), pp 257-73.

Boschen, Fred W., 'A proposed organization for machine gun companies' in *Journal of the Military Service Institution of the United States*, xlv (July, Sept., Nov. 1919), pp 144-49.

Bush, H.M., 'A year with a machine gun company' in *Journal of the Military Service Institution of the United States*, xl (Jan., Mar., May 1907), pp 78-88, 249-56.

Cotton, R., 'Machine gun references' in *Journal of the Military Service Institution of the United States*, liii (July, Sept., Nov. 1913), pp 467-70.

Carthew, Yorstoun, M.E., 'Machine guns' in *Journal of the Military Service Institution of the United States*, xxiii (June 1898), pp 525-35.

Grisell, E.L., 'Machine guns with cavalry' in *Journal of the Military Service Institution of the United States*, xlvii (July 1910), pp 59-64.

Herman, F.J., 'The machine gun platoon: should it be retained as part of the regimental organization' in *Journal of the U. S. Cavalry Association*, xix (July 1908-Apr. 1909), pp 335-46.

Hodges, H.L., 'The use of machine guns with the cavalry' in *Journal of the U.S. Cavalry Association*, xix (July 1908-Apr. 1909), pp 30-47.

Macomb, M.M., 'Machine guns in the Russian Army' in *Journal of the United States Infantry Association*, iii, no. 3 (Jan. 1903), pp 3-21.

Michaelson, G.H., 'Machine gun fire' in *Infantry Journal*, xi (July 1914-June 1915), pp 540-51.

Moudl, W.E., 'The modern machine gun' in *Journal of the Military Service Institution of the United States*, xlvi (Jan., Mar., May 1911), pp 230-36.

Parker, J., 'The machine gun platoon: should it be retained as part of the regimental organization' in *Journal of the U. S. Cavalry Association*, xix (July 1908-Apr. 1909), pp 48-53, 656-59.

Parker, J.H., 'Machine guns, uses of' in *Journal of the Military Service Institution of the United States*, xxiv (Jan., Mar., May 1899), pp 1-14.

Parker, J.H., 'Machine gun arm, the proper organization of the' in *Journal of the Military Service Institution of the United States*, xxiv (Jan., Mar., May 1899), pp 232-38.

Parker J.H., Dillenback, J.W., 'Uses of machine guns' in *Journal of the Military Service Institution of the United States*, xxiv (Jan., Mar., May 1899), pp 325-26.

Parker, J.H., 'Some observations on infantry technic 1914' in *Journal of the Military Service Institution of the United States*, lvi (Jan., Mar., May 1915), pp 187-203.

Parker, J.H., 'An organic unit for machine guns' in *Journal of the Military Service Institution of the United States*, xxxviii (Jan., Mar., May 1906), pp 540-43.

Phillips, A.E., 'Machine guns with the advanced guard' in *Journal of the United States Cavalry Association* (July 1912), pp 14-21.

Phillips, A.E., 'Machine gun experiments etc.' in *Journal of the United States Cavalry Association*, xx (July 1909), pp 70-80.

Reilly, H.J., 'The machine gun platoon: should it be retained as part of the regimental organization' in *Journal of the U.S. Cavalry Association*, xix (July 1908-Apr. 1909), pp 328-34.

Switzer, J.S., 'Concerning machine guns' in *Infantry Journal*, xvi (Jan. 1920), pp 571-79.

Vuillemier, E., 'Infantry versus machine guns' in *Journal of the United States Infantry Association*, iii, no. 3 (Jan. 1903), pp 143-154.

Williston, E.B., 'Machine guns and the supply of small arm ammunition on the battlefield' in *Journal of the Military Service Institution of the United States*, xxvi (June 1886), pp 121-66.

Wright, Major R.M., 'Machine gun tactics and organization' in *Army Quarterly* (1921), pp 290-313.

## **6. Divisional and unit histories (1919-34)**

Bach, Christian A., *The history of the Fourth Division, its services and achievements in the world war* (Washington, 1920).

Broun, Heywood, *The A.E.F. with General Pershing and the American Forces* (New York, 1919).



Bruce, A.D., *The machine gun support of the 2d Division in the Meuse-Argonne 1 November, 1918* (Fort Leavenworth, Kansas, 1933).

Chase, W.C., *A study of the operations of the Machine Gun units of the First division 18-23 July 1918* (Fort Leavenworth, Kansas, 1931).

Glass, E. L.N., *The history of the tenth cavalry* (Tucson, Arizona, 1921).

Headlam, Cutbert, *History of the Guards Division, 1915-1918*, (2 vols, London, 1934).

Hogan, H.T., and Marshall-Levey, M.R., *The Canadian "Emma Gees": a history of the Canadian Machine Gun Corps* (Ottawa, 1919).

Huidekoper, Frederic Louis, *The history of the 33<sup>rd</sup> Division A.E.F.* (Springfield, Illinois, 1921).

Little, John, G., *The official history of the eighty sixth Division* (Chicago, 1921).

Kipling, Rudyard, *The Irish Guards in the Great War* (2 vols, London, 1923).

Macdonald, S. C., *Machine gun operations during the attack of the 28<sup>th</sup> Division, Meuse-Argonne offensive 26 September to 8 October 1918* (Fort Leavenworth, Kansas, 1933).

Scott Walter C., *The A.E.F. in the World War – the Champagne-Marne Defensive July 15-18 1918 Memo* (Fort Leavenworth, Kansas, 1922).

## **7. Contemporary books (1874-1939)**

Applin, R.V.K., *Our task in the war* (Washington, 1917).

Applin, R.V.K., *Lectures on discipline and training by Colonel Applin of the British General Staff and hints to young officers by a British officer* (Washington, 1918).

Baker-Carr, C.D., *From chauffeur to brigadier* (London, 1938).

Bloch, I.S., *Is war now impossible* (London, 1899).

Boraston, J.H., *Sir Douglas Haig despatches* (London, 1919).

Cumming, Hanway R., *A Brigadier in France 1917-1918* (London, 1922).

Fuller, J. F. C., *Tanks in the Great War 1914-1918* (New York, 1920).

Godley, A.J., *Life of an Irish soldier: reminiscences of General Sir Alexander Godley* (London, 1939).

Grafton, C.S., *The Canadian "Emma Gees" a history of the Canadian Machine Guns Corps* (London Ontario, 1938).

- Hamilton, Ian, *A staff officer's scrap book during the Russo Japanese War* (London, 1908)
- Harington, Charles, *Plumer of Messines* (London, 1935).
- Hatcher, Julian S., Glenn, Wilhelm P., Malony, Harry J., *Machine guns* (Menasha, Wisconsin, 1917).
- Humphries, Mark Osborne (ed.), *The selected papers of Sir Arthur Currie diaries, letter, and reports to the Ministry, 1917-1933* (Ontario, 2008).
- Hutchinson, Graham Seton, *Warrior* (London, 1932).
- Jackson, V.A., *The organization of machines guns and their tactical uses with notes on training* (London, 1910).
- Lafond, George, *Covered with mud and glory, a machine gun company in action (Ma mitrailleuse)* (Boston, 1918).
- Livesay, J.F.B. *Canada's Hundred Days with the Canadian Corps from Amiens to Mons Aug. 8 – 11 Nov. 1918* (Toronto, 1919).
- Logan, H.T., Levey M.R., *History of the Canadian Machine Gun Corps, C.E.F.* (Ottawa, 1919).
- Longstaff, Major F.V. and Atteridge A. Hillard, *The book of the machine gun* (London, 1917).
- Luxford, J.H., *With the machine gunners in France and Palestine* (London, 1923).
- Lloyd George, David, *War memoirs of David Lloyd George, 1915-1916* (Boston, 1933).
- McBride, Herbert W., *A rifleman went to war* (New York, 1935).
- McBride, Herbert W., *The Emma Gees* (New York, 1918).
- McKellar, K. B., *Machine gun practice and tactics for officers, N.C.O.'s and men* (New York, 1917).
- Montgomery, Archibald, *The story of the Fourth Army in the Battles of the Hundred Days, August 8<sup>th</sup> to November 11<sup>th</sup>, 1918* (London, 1919).
- Owen, J.F., *Compound guns, many barrelled rifle batteries, machine guns, or mitrailleuses* (London, 1874).
- Parker, John H., *Tactical organization and uses of machine guns in the field* (Kansas City, 1899).
- Parker, John H., *History of the Gatling gun detachment : Fifth army corps, at Santiago, with a few unvarnished truths concerning that expedition* (Kansas City, 1898).

Parker, John H., *Trained citizen soldiery – a solution of General Upton's problem* (Menasha, Wisconsin, 1916).

Ross, Tenney, *Characteristics of the three arms – Course in organization and tactics* (Washington, 1904).

Short, Walter C., *The Divisional machine gun officer* (Fort Leavenworth, Kansas, 1920).

Walker, William K., *Canadian Motor Machine Gun Brigade with British Fifth Army March – April 1918* (Ottawa, 1957).

Wilhelm, Glenn P., *Machine gun fire control* (Cleveland, 1917).

Worthington, Larry, *'Worthy' a biography of Major General F.F. Worthington* (Toronto, 1961).

## **B. SECONDARY SOURCES**

### **1. Books**

Armstrong, David A., *Bullets and bureaucrats the machine gun and the United States Army, 1861-1916* (Westport CT., 1982).

Badsey, Stephen, *Doctrine and reform in the British cavalry, 1880-1918* (Aldershot, 2008).

Baylaucq, Dominique, Jacques, *Brutinel: the extraordinary story of a French citizen Brigadier- General in the Canadian Army* (Alberta, 2014).

Bercuson, David J., *The Patricias the proud history of a fighting regiment* (Toronto, 2001).

Bidwell, Shelford and Graham, Dominick, *Fire-power: the British army weapons & theories of war, 1904 – 1945* (London, 1982).

Boff, Jonathan, *Winning and Losing on the Western Front The British Third Army and the Defeat of Germany in 1918* (Cambridge, 2012).

Boff, Jonathon, 'Command culture and complexity Third Army during the Hundred Days, August –November 1918.' in Sheffield, Gary and Peter Gray, *Changing war the British Army, the hundred Days campaign and the birth of the Royal Air Force, 1918* (London, 2013).

Bruce, Robert, *Machine guns of World War I* (Wiltshire, 1997).

Chamberlain, Peter and Gander, Terry, *Machine guns* (London, 1974).

- Chinn, George M., *The machine gun – history, evolution and development of manual, automatic, and airborne repeating weapons* (3 vols., Washington, 1951).
- Chivers, C.J., *The gun the story of the AK-47* (London, 2010).
- Coffman, Edward M., *The regulars: the American Army, 1898-1941* (Boston, 2004).
- Cook, Tim, *At the sharp end: Canadians fighting the Great War, 1914–1916, volume one* (Toronto, 2007).
- Cook, Tim, *The madman and the butcher the sensational wars of Sam Hughes and General Arthur Currie* (Toronto, 2010).
- Cook, Tim, *Shock troops: Canadians fighting the Great War, 1917-1918, volume two* (Toronto, 2008).
- Cook, Tim, *Warlords: Borden, Mackenzie King, and Canada's World Wars* (Toronto, 2013).
- Cooke, James J., *Pershing and his generals – command and staff in the A.E.F.* (Westport CT, 1997).
- Coppard, George, *With a Machine Gun to Cambrai* (London, 1969).
- Cornish, Paul, *Machine guns and the Great War* (London, 2009).
- Crutchley, C.E., *Machine gunner, 1914-1918: personal experiences of the Machine Gun Corps* (Barnsley, 2005).
- Doughty, Robert A., *Pyrrhic victory French strategy and operations in the Great War* (London, 2005).
- Ellis, John, *The social history of the machine gun* (New York, 1975).
- Farrell, Theo and Terriff, Terry, *The sources of military change culture, politics, technology* (London, 2002).
- Ford, Roger, *The grim reaper: machine-guns and machine gunners in action* (Boston, 1996).
- Futrell, Robert Frank, *Ideas, concepts, doctrine: basic thinking in the United States Air Force, 1907–1960* (Alabama, 1989).
- Grafton C.S., *The Canadian “Emma Gees”: a history of the Canadian Machine Gun Corps* (London, 1938).
- Griffith, Paddy, *Battle tactics of the Western Front: the British army's art of attack, 1916-18* (London, 1994).

- Griffith, Paddy, 'The extent of tactical reform in the British Army' in Paddy Griffith (ed.), *British fighting methods in the Great War* (London, 1996).
- Goldsmith, Dolf L., *The grand old lady of no man's land: the Vickers machine gun* (London, 1994).
- Goldsmith Dolf L., *The devil's paintbrush: Sir Hiram Maxim's gun* (London, 1989).
- Grotelueschen, Mark Ethan, *The A.E.F. way of war: the American Army and combat in World War I* (New York, 2007).
- Hart, Peter, *1918 a very British victory* (London, 2008).
- Hart, Peter, *Voices from the Front: An oral history of the Great War* (London, 2015).
- Harvey, Arnold D. *Collision of empires: Britain in three world wars, 1793-1945* (London, 1992).
- Harris, J.P., *Men, ideas and tanks British military thought and armoured forces, 1903-1939* (Manchester, 1995).
- Harris, J.P., *Amiens to the Armistice the BEF in the hundred days' campaign 8 August – 11 November 1918* (London, 1998).
- Hastings, Max, *Catastrophe: Europe goes to war 1914* (London, 2013).
- Holmes, Richard, *The Western Front* (London, 2009).
- Hogg, Ian V. and Batchelor, John, *The machine-gun* (London, 1976).
- Humphries, Mark Osborne (ed.), *The selected papers of Sir Arthur Currie diaries, letter, and reports to the Ministry, 1917-1933* (Ontario, 2008)
- Humphries, Mark, and Maker, John, (eds.) *Germany's Western Front: 1915, Translations from the German Official History of the Great War* (Ontario, 2010).
- Hutchinson, Graham Seton, *Machines guns: their history and tactical employment (being also a history of the Machine Gun Corps, 1916-1922)* (London, 1938).
- Ivanov, A., Jowett, P., *The Russo-Japanese War 1904-05* (Oxford, 2004).
- Larson, Robert H., *The British Army and the theory of armored warfare, 1918-1940* (London, 1984).
- Middlebrook, Martin, *The Kaiser's Battle* (London, 1978).
- Murray, Williamson and Allan R. Millet (eds), *Military innovation in the interwar period* (New York, 1998).

Ney, Virgil, *Organisation and equipment of the infantry rifle squad: from valley forge to road* (Fort Belvoir, Virginia, 1965).

Palazzo, Albert, *Seeking victory on the Western Front: the British Army and chemical warfare in World War I* (London, 2000).

Pegler, Martin, *The Vickers-Maxim machine gun* (Oxford, 2013).

Popenker, Maxim and Williams Anthony G., *Machine gun: the development of the machine gun from the nineteenth century to the present day* (Ramsbury, Wiltshire, 2008).  
Philpott, William, *Bloody victory the sacrifice of the Somme and the making of the Twentieth Century* (London, 2009).

Philpott, William, *War of attrition fighting the First World War* (New York, 2014).

Pugsley, Christopher, *The ANZAC experience: New Zealand, Australia and Empire in the First World War* (Auckland, 2004).

Posen, Barry R., *The sources of military doctrine: France, Britain, and Germany between the world wars* (New York, 1984).

Radley, Kenneth, *Get tough stay tough shaping the Canadian Corps, 1914-1918* (Solihull, West Midlands, 2014).

Reid, Brian Holden, *Studies in British Military Thought: Debates With Fuller and Liddell Hart* (Nebraska, 1998).

Rowbotham, Edward, *Mud, blood and bullets memoirs of a machine gunner on the Western Front* (Stroud, Gloucestershire, 2010).

Rawling Bill, *Surviving trench warfare technology and the Canadian Corps 1914-1918* (Toronto, 1992).

Robbins, Simon, *British Generalship during the Great War the military career of Sir Henry Horne 1861-1919* (Farnham, Ashgate, 2010).

Rosen, Stephen Peter, *Winning the next war innovation and the modern military* (New York, 1991).

Schreiber, Shane B., *Shock army of the British Empire: the Canadian Corps in the last 100 days of the Great War* (Westport Connecticut, 2005).

Schreier, Konrad F., *Guide to United States machine guns* (Salem, Oregon, 1971).

Samuels, Martin, *Command or control? Command, training and tactics in the British and German armies, 1888-1918* (London, 1995).

Sheffield, Gary, *Command and Morale the British Army on the Western Front 1914-1918* (Barnsley, 2014).

- Sheffield, Gary and Dan, Todman, (eds.), *Command and control on the Western Front the British Army's experience 1914-1918* (Kent, 2004).
- Sheffield, Gary and John Bourne (eds.), *Douglas Haig war diaries and letters, 1914-1918* (London, 2005).
- Sheffield, Gary, *Forgotten Victory: the First World War - myths and realities* (London, 2001).
- Sheffield, Gary, *The Chief: Douglas Haig and the British Army* (London, 2011).
- Simkins, Peter, *From the Somme to victory the British Army's experience on the Western Front 1916-1918* (Barnsley, 2014).
- Smith, Anthony, *Machine gun: the story of the men and the weapon that changed the face of war* (London, 2002).
- Steinberg, W. John, Menning, Bruce W., van der Oye, David Schimmelpenninck, Wolff, David, Yokote, Shinji,(eds.) *The Russo-Japanese War in global perspective World War Zero* (Boston, 2005).
- Strachan, Hew, *The First World War* (London, 2003).
- Strachan, Hew, (ed.), *The Oxford illustrated history of the First World War* (Oxford, 2014).
- Strohn, Matthias, (ed.), *World War I companion* (Oxford, 2013).
- Swettenham, *John McNaughton Volume 1, 1887-1939* (Toronto, 1968).
- Terraine, John, *White Heat: the new warfare, 1914-18* (London, 1982).
- Thompson Jim, *Machine guns: a pictorial, tactical and practical history* (London, 1990).
- Thompson, Rob, ‘‘Delivering the Goods.’ Operation Landoverly Castle: a logistical and administrative analysis of Canadian Corps preparation for the Battle of Amiens 8-11 August 1918.’ in Sheffield, Gary and Peter Gray, *Changing war the British Army, the hundred Days campaign and the birth of the Royal Air Force, 1918* (London, 2013).
- Travers, Tim, *How the War was Won – Command and technology in the British Army on the Western front, 1917-1918* (London, 1992).
- Travers, Tim, *The Killing Ground: the British Army, the Western Front & the emergence of modern war, 1914-1918* (3rd edn., Barnsley, 2009).
- Tremblay, Yves, ‘Brutinel: A unique kind of leadership’ in Bernd Horn and Stephen John Harris (eds.), *Warrior chiefs: perspectives on senior Canadian military leaders* (Canada, 2001).

Trewhitt, Philip, *Armoured Fighting Vehicles* (Bristol, 1999).

Walter, John, *Machine guns of two world wars* (London, 2005).

## 2. Journal Articles

Applin, R.V.K., 'Machine gun tactics in own and other armies' in *Military Journal*, (June 1911), pp 247-66.

Avant, Deborah D., 'The institutional sources of military doctrine: hegemons in peripheral wars' in *International Studies Quarterly*, xxxvii, no. 4 (Dec. 1993), pp 409-30.

Boff, Jonathan, 'Combined arms during the hundred days campaign August-November 1918' in *War in history*, vii, no. 4 (2010), pp 459-478.

Brennan, Patrick H., 'Byng's and Currie's commanders: a still untold story of the Canadian Corps' in *Canadian Military History*, xi, no. 2 (Spring 2002), pp 5-16.

Brown, Ian M., 'Not glamorous, but effective: the Canadian Corps and the set-piece attack, 1917-1918' in *Journal of Military History*, liix, no. 3 (July 2006), pp 421-44.

Cook, Tim, 'The blind leading the blind: the Battle of the St. Eloi Craters', in *Canadian Military History*, v, no. 2, (Autumn, 1996), pp 24-36.

Echevarria II, A.J., 'The cult of the offensive revisited: confronting technological change before the Great War' in *Journal of Strategic Studies*, xxv (2002), pp 199-214.

Farrell, Theo, 'Improving in War: Military adaptation and the British in Helmand Province, Afghanistan, 2006-2009' in *Journal of strategic studies*, xxxiii, no. 4 (2010), pp 567-594.

Foley, Robert T., 'A case study in horizontal military innovation: the German Army, 1916-1918' in *Journal of Strategic Studies*, lxxv, no. 6 (Dec. 2012), pp 799-827.

Foley, Robert T., 'Dumb donkeys or cunning foxes? Learning in the British and German armies during the Great War' in *International Affairs*, xc, no. 2 (2014), pp 279-298.

Foley, Robert T., 'Transformation in contact': learning the lessons of modern war' in *International Affairs*, lxxxvii, no. 2, (2011), pp 253-270.

Graham, Dominick, 'The British Expeditionary Force in 1914 and the machine gun' in *Military Affairs*, xlvi, no. 4 (Dec. 1982), p. 192.

Grissom, Adam, 'The future of military innovation studies' in *Journal of Strategic Studies*, xxix, no. 5 (Oct. 2006), pp 905-34.



- Grodzinski, John R., "We few, we happy few" Canadian generalship in the First World War' in *Canadian Military Journal* (Autumn 2006), pp 75-87.
- Hallifax, Stuart, 'Over by Christmas: British popular opinion and the short war of 1914' in *First World War Studies*, i, no. 2 (Oct. 2010), pp 103-21.
- Haynes, Alex D., 'The development of infantry doctrine in the Canadian Expeditionary Force, 1914-1918' in *Canadian Military Journal*, (Autumn 2007), pp 63-72.
- Homan, Kees, 'Doctrine' in Anna Aldis and Margriet Drent (eds), *Common norms and good practices of civil-military relations in the EU* (Groningen, 2008), pp 109-26.
- Hyland, Chris, "The Canadian Corps' long march logistics, discipline, and the occupation of the Rhineland' in *Canadian Military History*, xxi, no. 2, (Spring, 2012), pp 5-20.
- Iacobelli, Teresa, "A participant's history?": the Canadian Broadcasting Corporation and the manipulation of oral history' in *Oral History Review*, xxxviii, no. 2, (Summer/Fall, 2011), pp 331-348.
- Jessee, Erin, 'The limits of oral history: ethics and methodology amid highly politicized research settings' in *Oral History Review*, xxxviii, no. 2, (Summer/Fall, 2011), pp 287-307.
- Jones, V.C., 'Before the colors fade: last of the rough riders' in *American Heritage Magazine*, 20, issue 5 (Aug. 1969).
- Jungdahl Adam M. and Macdonald, Julia M., 'Innovation inhibitors in war: overcoming obstacles in the pursuit of military effectiveness' in *Journal of Strategic Studies*, xxxix, no. 5 (July 2014), pp 467-499.
- McCarthy, Chris, 'Nobody's child: a brief history of the tactical use of machine guns the British Army, 1914-1918' in *Imperial War Museum Review*, no. 8 (1993), pp 63-71.
- McCulloch, Ian M., 'A war of machines – A re-assessment of the Canadian Machine Gun Corps: innovation or tactical expedient?' in *Canadian Army Journal*, xi, no.2 (Summer 2008), pp 82-92.
- McNaughton, A.G.L., 'The capture of Valenciennes, a study in co-ordination' in *Canadian Defence Quarterly*, x, no. 3 (Apr. 1993), pp 279-94.
- Morton, Desmond, 'Changing operational doctrine in the Canadian Corps, 1916-1917' in *the Army Doctrine and Training Bulletin*, ii, no. 4 (Winter 1999), pp 35-9.
- Murray, Williamson, 'Comparative approaches to interwar innovation' in *Joint Force Quarterly*, (Summer 2000), pp 83-90.
- Murray, Williamson, 'Thinking about innovation' in *Naval War College Review*, liv, no. 2 (Spring 2001), pp 119-29.

Murray, Williamson, 'Innovation: past and future' in *Joint Force Quarterly*, No. 34 (Summer 1996), pp 51-60.

Murray, Williamson, 'Transformation and innovation: the Lessons of the 1920s and 1930s' in *Institute for Defence Analyses* (Dec. 2002), pp 10-41.

Murray, Williamson, 'Transformation and 'innovation: 'Looking at two distinct periods military innovation: 1872-1914 and 1920-1939' in *Institute for Defence Analyses* (Dec. 2002), pp 42-92.

Murray, Williamson, *Military adaption in war* in Institute for defence analysis (Alexandria, Virginia, 2009).

Philpott, William, 'Beyond the 'Learning Curve': The British Army's Military Transformation in the First World War' in *Commentary*, 10 November 2009, Europe, History, Land Forces <https://rusi.org/commentary/beyond-learning-curve-british-armys-military-transformation-first-world-war> ( 25 April 2017).

Posen, Barry P., 'Nationalism, the mass army, and military power' in *International Security*, xviii, no. 6, (Fall, 1993), pp 80-124.

Pugsley, Christopher, 'Haig and the implementation of tactical doctrine on the Western Front' in *Sandhurst Occasional Paper* no. 8 (Royal Military Academy Sandhurst, 2011), pp 1-46.

Pulsifer, Cameron, 'Canada's first armoured unit Raymond Brutinel and the Canadian Motor Machine Gun Brigades of the First World War' in *Canadian Military History*, x, no. 1 (Winter 2001), pp 44-57.

Pulsifer, Cameron, 'Death at Liscourt: an historical and visual record of five fatalities in the 1<sup>st</sup> Canadian Motor Machine Gun Brigade, 25 March 1918' in *Canadian Military History*, xi, no. 3 (Summer 2002), pp 49-64.

Reid, Brian Holden, 'What is command culture?' in *Journal of Strategic Studies*, xxxviii, no. 1-2 (2015), pp 215-231.

Sheffield, Gary, 'Doctrine and command in the British Army: a historical overview' in *Army Doctrine Publication Land Operations* (Shrivenham, 2010), pp 244-67.

Sheffield, Gary, 'How even was the learning curve reflections on the British and Dominion Armies on the Western Front 1916-1918' in *Proceedings of the Canadian Military History Conference* (Ottawa, May 2000). pp 125-34.

Shimshoni, Jonathan, 'Technology, military advantage, and World War I: a case for military entrepreneurship' in *International Security*, (Winter 1990/91), pp 187-215.

Steinberg, John W., 'The Russo-Japanese War and world history' in *The Russian Review*, lxvii, no. 1 (Jan., 2008) pp 1-7.

Rainey, James W., 'Ambivalent warfare: the tactical doctrine of the A.E.F. in World War 1' in *Journal of the US Army War College*, xiii, no. 3 (Sept. 1983), pp 34-46.

Rawling Bill, 'Technology in search of a role the machine gun and the CEF in the First World War' in *Material Culture Review/Revue de la culture matérielle*, xlii (Fall 1995) (<http://journals.hil.unb.ca/index.php/MCR/article/view/17667>)(12 May 2013).

Rosen, Stephen Peter, 'New ways of war: understanding military innovation' in *International Security*, xiii, no. 1 (Summer 1988), pp 134-68.

Roxborough, Ian, 'Organizational innovation: lessons from military organizations' in *Sociological Forum*, xv, no. 2 (June 2000), pp 367-72.

Sapolsky, Harvey M., 'On the theory of innovation' in *Breakthrough*, ix, no. 1 (Spring 2000), pp 35-9.

Travers, Tim, 'The evolution of British Strategy and tactics on the Western Front in 1918' in *G.H.Q. Manpower and Technology, Journal of Military History*, liv, no. 2 (Apr. 1990), pp 173-200.

Travers, Tim, 'The Offensive and the problem of innovation in British military thought 1870-1915' in *Journal of Contemporary History*, xiii, no. 3 (July 1978), pp 531-53.

Travers, Tim, 'Technology, tactics, and morale: Jean de Bloch, the Boer War, and British military theory, 1900-1914' in *Journal of Modern History*, li, no. 2 (June 1979), pp 264-86.

Tremblay, Yves, 'Brutinel: a unique kind of leadership' in Bernd Horn and Stephen John Harris (eds.), *Warrior chiefs: perspectives on senior Canadian military leaders* (Toronto, 2001).

Van Evera, Stephen, 'The cult of the offensive and the origins of the First World War' in *International Security*, ix, no. 1 (Summer 1984), pp 58-103.

Van Tol, Jan M., 'Military innovation and carrier aviation – the relevant history' in *Joint Force Quarterly*, no. 16 (Summer 1997), pp 77-87.

Weist, Andrew, 'Preferring to learn from experience: the American Expeditionary Force in 1917' in Peter Dennis and Jeffery Grey (eds), *1917: Tactics, training and technology* (Canberra, 2007).

Wright, Major R.M., 'Machine gun tactics and organization' in *Army Quarterly*, (1921), pp 290-313.

### **3. Unpublished theses**

Fox-Godden, Aimée, ‘‘Putting knowledge in power’’: learning and innovation in the British army of the First World War’ (PhD thesis, University of Birmingham, 2015).

French, Craig F., ‘The 51<sup>st</sup> (Highland) Division during the First World War’ (PhD thesis, University of Glasgow, 2006).

Harris, Paul Martin, ‘The men who planned the war a study of the staff of the British Army on the Western Front 1914-1918’ (PhD thesis, King’s College London, 2013).

Harvey, Trevor Gordon, ‘An army of Brigadiers’ British brigade commanders at the Battle of Arras 1917’ (PhD thesis, University of Birmingham, 2015).

Hodgkinson, Peter Eric, ‘British infantry battalion commanders in the First World War’ (PhD thesis, University of Birmingham, 2013).

Jones, Spencer, ‘The influence of the Boer War (1899-1902) on the tactical development of the regular British Army 1902-1914’ (PhD thesis, University of Wolverhampton, 2009).

Kenda, Daniel J., ‘Lessons learned from the use of machine gun during the Russo-Japanese War and the application of those lessons by the protagonists of World War I’ (M.A. thesis, U.S. Army Command and General Staff College, 2005).

Kenny, Thomas, ‘A study of the development of British machine gun tactics during the First World War, with reference to Guards Machine Gun Regiment’ (M.A. thesis, Maynooth University, 2010).

Kenyon, David, ‘British cavalry on the Western Front 1916-1918’ (PhD thesis, University of Cranfield, 2007).

Holden, Michael James, ‘Constantly shifting and constantly adapting: the tactical exploits of the Canadian Motor Machine Gun Brigades, 1914-1918’ (M.A. thesis, University of New Brunswick, 2003).

Mitchell, Stuart Bruce Taylor, ‘An inter-disciplinary study of learning in the 32<sup>nd</sup> Division on the Western Front, 1916-1918’ (PhD thesis, University of Birmingham, 2013).

Robbins, Simon Nicholas, ‘British Generalship on the Western Front in the First World War, 1914 – 1918’ (PhD thesis, King’s College London, 2001).

Saunders, Anthony, ‘A muse of fire British trench munitions, their invention, manufacture and tactical employment on the Western Front, 1914-18’ (PhD thesis, University of Exeter, 2008).

Simpson, Andrew, ‘The operational role of British corps command on the Western Front, 1914-18’ (PhD thesis, University College, London, 2001).

Williams, Dennis, ‘British Second Army and coalition warfare in Flanders in the Hundred Days, 1918’ (PhD thesis, University of Birmingham, 2015).

Zabecki, David T., 'Operational art and the German 1918 offensives' (PhD thesis, University of Cranfield, 2004).

#### 4. Internet sources and film

Canadian Expeditionary Force Study Group.

(<http://www.cefresearch.ca/phpBB3/viewtopic.php?f=26&t=966&start=60>) (11 June 2013).

Cullums register at Bill Thayer's web site

[http://penelope.uchicago.edu/Thayer/E/Gazetteer/Places/America/United\\_States/Army/USMA/Cullums\\_Register/3498\\*.html](http://penelope.uchicago.edu/Thayer/E/Gazetteer/Places/America/United_States/Army/USMA/Cullums_Register/3498*.html) (2 Apr. 2015).

Kings Own Royal Regiment Museum, Lancaster.

<http://www.kingsownmuseum.plus.com/index.htm> (2 Apr. 2014).

British Pathé <http://www.britishpathe.com/video/all-anti-wasters/query/Lieutenant> (19 July 2017).

Battle of Vimy Ridge documentary episode 5/10 available at

[http://www.youtube.com/watch?list=PL48F94A3814306EC9&v=n7UAgZYJQyY&feature=player\\_detailpage](http://www.youtube.com/watch?list=PL48F94A3814306EC9&v=n7UAgZYJQyY&feature=player_detailpage) (10 Jan. 2014).

Victory parade of Canadian Corps through Mons, 11 Nov. 1918.

<http://www3.nfb.ca/ww1/postwar-film.php?id=531538> (10 Jan. 2014).

The long, long trail the British Army in the Great War of 1918-1918,

<http://www.longlongtrail.co.uk/army/regiments-and-corps/machine-gun-corps-in-the-first-world-war/motor-machine-guns-of-the-first-world-war/> (2 March 2017).

Newsreel item on a British machine gun team practising on a beach in Flanders, probably 1915.

<http://www.iwm.org.uk/collections/item/object/1060023373> (10 Jan. 2014).

The British Army Machine Gun School in France, Dec. 1915.

<http://www.iwm.org.uk/collections/item/object/1060022703?bt=europeanaapi> (10 Jan. 2014).

Demonstrations of tactics with the Vickers machine gun at the Machine Gun Corps Training School at Rombly, France, 15-17 June 1918.

<http://www.iwm.org.uk/collections/item/object/1060022732> (10 Jan. 2014).

NYPL Digital Gallery.

[http://digitalgallery.nypl.org/nypldigital/dgkeysearchdetail.cfm?trg=1&strucID=136577&imageID=117088&total=122&num=0&parent\\_id=133491&word=&s=1&notword=&d=&c=&f=&k=0&sScope=&sLevel=&sLabel=&lword=&lfield=&imgs=20&pos=16&snum=0&e=w#\\_seemore](http://digitalgallery.nypl.org/nypldigital/dgkeysearchdetail.cfm?trg=1&strucID=136577&imageID=117088&total=122&num=0&parent_id=133491&word=&s=1&notword=&d=&c=&f=&k=0&sScope=&sLevel=&sLabel=&lword=&lfield=&imgs=20&pos=16&snum=0&e=w#_seemore) (30 Oct. 2011).